Supreme Court, U. S.
FILED
JUL 5 1979
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1979

No. 79-19

PAULEY PETROLEUM INC., COLORADO OIL AND GAS CORPORATION, MESA PETROLEUM CO., MCCULLOCH OIL CORPORATION OF CALIFORNIA, HUSKY OIL COMPANY OF DELAWARE and MACDONALD OIL CORPORATION,

Petitioners,

—against—

THE UNITED STATES OF AMERICA, J. M. HUBER CORPORATION, MIDWEST OIL CORPORATION, ASHLAND OIL & REFINING COMPANY, KEWANEE OIL COMPANY and FOREST OIL COMPANY,

Respondents.

ON A PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CLAIMS

PETITIONERS' APPENDIX OF DECISIONS

JOHN P. OHL
H. RICHARD SCHUMACHER
80 Pine Street
New York, New York 10005
(212) 825-0100
Attorneys for Petitioners

Of Counsel:

CAHILL GORDON & REINDEL
LEWIS A. SHAFFER
JOHN C. KOUTSOS
80 Pine Street
New York, New York 10005

EDWARD KLIEWER, JR.
2210 Mercantile Bank Building
Dallas, Texas 75201

July 3, 1979

TABLE OF CONTENTS

Page

Item A -

Opinion of Court of Claims dated January 24, 1979. . . . . A1

Item B -

Order of Court of Claims dated January 24, 1979. . . . . A37
(Modifying Opinion and Findings)

Item C -

Order of Court of Claims dated April 6, 1979 . . . . . A41
(Denying rehearing)

Item D -

Report of Trial Judge dated March 19, 1976. . . . . A43

Item E -

Order of Court of Claims dated November 10, 1975 . . . . . A335
(Curtailing Trial Judge's Reference)

ITEM A

Opinion of Court of Claims
dated January 24, 1979

IN THE

United States Court of Claims

No. 197-69

(Decided January 24, 1979)

PAULEY PETROLEUM INC., ET AL. v. THE UNITED STATES

John P. Ohl, attorney of record, for plaintiffs. *H. Richard Schumacher, Frank W. Krogh, Cahill Gordon & Reindel*, and *Edward Kliewer, Jr.*, of counsel.

Myles E. Flint, with whom was *Assistant Attorney General James W. Moorman*, for defendant.

Before DAVIS, NICHOLS, KUNZIG, BENNETT, and SMITH, *Judges, en banc.*

OPINION

DAVIS, *Judge*, delivered the opinion of the court:

Claimants are oil-company lessees of federal offshore lands in Santa Barbara Channel, California. Late in January 1969 there occurred, on another leasehold in that area, a very serious oil blowout. Plaintiffs' leaseholds were not physically affected by that incident but their contention is that their leasehold rights were frustrated, violated, and taken by the Government's conduct following the blowout.

The case was tried before Trial Judge Hogenson who has made extensive and careful findings of fact which we adopt without substantial change.[1] In Part I of this opinion, we summarize the facts pertinent to our decision. Part II deals with a preliminary jurisdictional issue. In Part III we review the arguments for recovery presented by the companies, including a late motion setting forth an additional, more restricted, theory of damages.

I

The Facts

A. *The leases, and initial unsuccessful drilling (March 1968-January 1969):* Plaintiffs make up a consortium of oil corporations which acquired from the Government two leases, numbered OCS–P–0218 and OCS–P–0226 (covering tracts 375 and 384 respectively), of submerged lands on the outer continental shelf in Santa Barbara Channel, off California. After purchase of the leaseholds in 1968 and various assignments of interests in that year, each company retained a percentage ownership ranging from 15.3% to 2.5% in either or both tracts 375 and 384.

In the fall of 1967 notice for bids on outer continental shelf land in the Santa Barbara Channel was published. Pauley Petroleum Inc. (Pauley) and other associated companies bid and won the two leases. Before bidding Pauley and some other companies in the joint venture had conducted extensive exploration of the area. The leases were executed in March 1968. Pauley and the original lessees paid $43,503,147 and $30,351,447 in bonuses for tracts 375 and 384, respectively. In addition, they were required to pay $17,280 per annum for the basic five-year term of each lease as a minimum rent. After winning the bid, the consortium selected Pauley as the "operator" for the purposes of managing exploration and drilling, and established an operating committee to supervise all exploration and development activities.

[1] Because of their length, we do not print the findings although we adopt them. By direction of the court, the trial judge limited himself to making factual findings.

Under the Outer Continental Shelf Lands Act, Pub. L. No. 212, 83d Cong., 1st Sess., 43 U.S.C. §§ 1331–1343 (1970) (OCS Act), the legislation authorizing plaintiffs' oil leases, the Interior Department is the governmental agency with general cognizance of operations under the leases, and the Secretary has from time to time issued regulations and orders relating to drilling and operations on the outer continental shelf. The leases themselves were on a standard Interior form which granted an exclusive right to drill and extract oil and gas. Lessees were also given the right to erect drilling platforms and conduct geological explorations. Each lease was made subject to the OCS Act, and stated that all reasonable regulations were made a part of the lease "* * * when not inconsistent with any express and specific provisions herein, which are made a part hereof."

With Interior's consent, the Pauley group conducted exploration of the two tracts during the period from March 1968 through January 1969. The exploration involved drilling of eight wells, seven on tract 373 (including one redrill) and one on tract 384, and the total drilling costs came to approximately $3.8 million. All eight wells were dry holes, none producing oil in commercially usable quantities. The trial judge found, and we agree, that "the abandonment of all of the exploratory wells as not commercially producible had to be discouraging to the plaintiffs." Several of the participants reflected their disappointment by selling their investments cheaply, writing all or part of them off, or amortizing them over the lease-terms.[2] However, this unsuccessful drilling did indi-

[2] As to three (Kewanee, TransOcean, and Ashland), our finding is "that such parties had lost their enthusiasm about the success of the exploratory operations, and did not share the optimistically high values of subject tracts as potential reservoir areas as presented by the original plaintiffs in the trial of this case." Another company (Colorado) told its stockholders, in its report for 1968, that it had written off the leasehold and drilling costs on these tracts because the leases did not have reserves capable of development of these leases were marginal. Midwest and Pauley also wrote off or amortized significant investment costs. Out of twelve companies holding interests in the two tracts, seven offered to sell, sold, or wrote off all or a substantial part of their investment by early 1969.

cate the presence of hydrocarbons, signifying the possibility of oil reserves. Serious differences exist among the expert witnesses as to the interpretation of the hydrocarbon deposits and the potential value of any possible reservoirs of oil.

B. *The oil spill, government suspension of operations, imposition of new regulations, orders, and filing procedures (January 28, 1969-April 9, 1969):* On January 28, 1969, a Union Oil well on outer continental shelf lands in the Santa Barbara Channel blew out, creating an oil slick of about fifty square miles which caused severe property and environmental damage. There immediately developed a political climate of great concern over any future drilling on continental shelf lands in the Channel. A further consequence of the Union Oil disaster was the collapse of the insurance market covering damages caused by offshore oil spills.[3]

The most critical events for this case all occurred between the oil spill on January 28, 1969, and plaintiffs' filing of this suit on April 9, 1969—a period of somewhat over two months. Without giving unnecessary details, we shall itemize the principal government actions during this period, many of which plaintiffs emphasize in this litigation.

1. From January 28 to February 3, 1969, all oil companies which had operating wells in the Santa Barbara Channel at the time of the Union Oil blowout—plaintiffs were not among them—suspended operations voluntarily at the Secretary of the Interior's request, pending a review of conditions there by the Government. After initially clearing these companies for resumption of drilling on February 3rd, Secretary Hickel, under sharp political criticism, reversed himself and on February 7th sent telegrams to the five companies then operating, ordering

[3] Plaintiffs conceded at oral argument that the collapse of the insurance market covering offshore oil spills was not caused by any of the government regulations or actions subsequent to the Union Oil blowout. Rather, the collapse was the direct result of a series of costly oil spill accidents, capped by the Santa Barbara blowout. Our finding attributes this collapse of the insurance market to the Union well blowout and oil spill, not to the subsequent governmental actions.

them to cease all drilling and production. Pauley, which was not then operating a well, did not receive a telegram.[4] During this period, Secretary Hickel informed Dr. Pecora, Director of the Geological Survey in charge of offshore oil regulations, that Hickel wanted three programs implemented: (1) a determination of the cause of and methods to stop the oil spill; (2) review of all relevant regulations and orders; (3) review of the sufficiency of information given by lessees to the Geological Survey. Dr. Pecora began implementing Hickel's program by establishing three task forces. Two of these task forces were devoted to point 1 of Hickel's program, and the third was responsible for point 3—reviewing the sufficiency of technical information provided by lessees. Dr. Pecora himself led a review with various Interior Department officials of existing regulations and orders.

Also on February 7, 1969, Secretary Hickel imposed further requirements for clearing future drilling in the Santa Barbara outer continental shelf. He instructed Dr. Pecora that all actions on Santa Barbara leases were to be cleared directly through the Secretary's office. Dr. Pecora by phone so informed the Geological Survey regional supervisor for the Pacific, who prior to that time had been delegated direct authority to grant drilling permits.

2. The federal action which most concerned plaintiffs was the promulgation of a new regulation relating to a lessee's liability for oil spills. This was published in the Federal Register on February 21, 1969, adding a new subparagraph (b) to 30 C.F.R. § 250.42, as follows:

[4] On February 10, 1969, Pauley sent a telegram to Secretary Hickel, referring to Hickel's February 7th telegram ordering the then-operating oil companies to suspend operations. Pauley's telegram stated that it was ready to drill and asked for Secretary Hickel's position. The Government's response to the telegram is unclear. The Director of the Geological Survey, Dr. Pecora, saw the telegram and the telegram bears a handwritten notation that Pecora advised the Geological Survey regional supervisor to respond, by emphasizing that a "detailed review for safety factors requires deferment of decision to resume operations." Dr. Pecora does not recall specifically discussing the telegram with the regional supervisor and apparently no official response was received by Pauley. The telegram also contains a written notation by Dr. Pecora that a general telegram detailing additional information required from Pauley would be sent, and a subsequent separate notation that such a telegram was sent on March 1, 1969.

> If the waters of the high seas are polluted by the drilling or production operations of the lessee, and such pollution damages or threatens to damage aquatic life, wildlife, or public or private property, the control and removal of the pollutant and the reparation of any damage, to whomsoever occurring, proximately resulting therefrom shall be at the expense of the lessee * * *
>
> 34 *Fed. Reg.* 2503–2504 (1969).

(As indicated in Part III, A, *infra*, a proposal to change this regulation was announced early in May 1969 and a modification was made in August 1969.)

Pauley apparently interpreted the new regulation to impose absolute liability not only for costs of cleanup, but also for any damage to a third party's property from an oil spill (no matter how caused), and that such liability applied retroactively to existing leases.[5] On March 12, 1969, a special meeting of the Pauley group's operating committee was held, and one of the primary items on the agenda was a discussion of problems caused by the alleged change in the standard of liability. Pauley announced that it had retained a law firm, and after a presentation by a member of the firm, it was decided that the necessary papers for filing a lawsuit would be prepared immediately. Two members of the lessee group stated that they would join the suit, and all other members were to advise Pauley as soon as possible as to their decision. The minutes of the meeting reveal that most of the members present stated they would not participate in further Santa Barbara drilling while the presumed "absolute liability" regulation remained in effect.

3. On February 11, 1969, the Pauley group filed with the Geological Survey's Los Angeles office an application for a

---

[5] The precise understanding of the change by Pauley (and its co-lessees) is difficult to pinpoint. In a memorandum to all partners dated February 24, 1969, Pauley exhibited some confusion as to the coverage of the revised liability standard:

> As it now stands, the industry is liable for all damage whether or not any negligence or fault existed. However, I believe this rule 250.42 [the amended regulation] applies everywhere. The point is not too clear.

This February 24th memorandum also demonstrates that, almost immediately after promulgation of the new regulation, Pauley was investigating a possible lawsuit by the consortium.

permit to drill a second well on Tract 384. One of plaintiffs' major complaints is that this application was never acted upon. During February and March 1969, it is clear, Interior was in the process of revising its orders controlling drilling for and operating oil wells on the outer continental shelf (so-called "OCS orders"); the Pauley group was aware that such a process was going on. On March 28, 1969, OCS Order No. 10 was promulgated, terminating the prior OCS Order on the subject, and imposing more stringent requirements for casing, cementing, mud drilling and blowout procedures. Order No. 10 stated that no drilling would be allowed until all pipelines used to transport oil to shore facilities were inspected by the Geological Survey. The order did not say expressly that its requirements were retrospective but it did state that each application to drill had to fulfill the new requirements. On April 4, 1969 copies of OCS Order No. 10 were provided to all OCS lessees in the Santa Barbara Channel. The Pauley group never amended its February 11th application (to drill a second well on tract 364) so as to accord with Order No. 10.

4. Under the Secretary's program, Interior also sought further physical information from the Santa Barbara Channel lessees who were directed, on March 1, 1969, to furnish "all available geological, geophysical and structural information." The returns were studied on a lease-by-lease basis and reports thereon were submitted to the Secretary to aid in future clearances for drilling in the Channel. On March 21st, the Secretary indicated that, as soon as detailed studies were completed on the basis of this new information, the oil companies would be allowed to resume operations in their present locations.

The Pauley group delayed its response to this demand and never fully answered. On March 12, 1969, this matter was discussed at a special meeting of the group's operating committee. The minutes state:

> It was decided that the decision as to whether or not we furnish the geological geophysical and structural information demanded by the Secretary of Interior would be held in abeyance until final decision has been made regarding the filing of the proposed lawsuit.

A few days later, Pauley, as operator, repeated this idea in a letter to one co-lessee, with copies to all the others. Pauley also twice told the Geological Survey that it understood that the demand for new data did not apply to the Pauley group unless a drilling permit was sought and required. The Geological Survey agreed with this understanding. On April 4, 1969, five days before the institution of the suit, Pauley furnished some but not the complete data called for by Interior. Although the transmittal letter said that the Pauley group would provide additional information as needed, it never sent all the data sought by Interior.[6]

On April 1, 1969, Secretary Hickel, after receiving additional information from his task force clearance program, approved for renewed operations five leases in the Santa Barbara Channel, four of which had been earlier suspended. Most other oil companies supplied the additional information required under the clearance program and ultimately had their leases cleared. After clearance, the Geological Survey regional supervisor had authority to grant drilling permits and operations on the leases pursuant to the normal regulations, as amended. In fact, some actual drilling on other outer continental shelf leaseholds in the Channel was resumed as early as April 1969. *See Sun Oil Co. v. United States*, 217 Ct. Cl. ____, 572 F.2d 786, 797, 798 (1978).

c. *The filing of this suit (April 9, 1969):* The petition in this court was filed on April 9, 1969, raising as its foremost claim that the new regulation promulgated on February 21, 1969—said to impose for the first time an "absolute liability" standard for oil pollution—made plaintiffs' leases economically worthless and exposed them to unmeasurable risks. Only six of the lessees joined in the petition.[7] The remaining partners[8] were later joined as involuntary

[6] Although plaintiffs assert they had already filed all required information, the Trial Judge found, and we agree, that plaintiffs did not fully supply the information requested by Interior in March 1969.

[7] These were: Pauley Petroleum Incorporated, Colorado Oil and Gas Corporation, Mesa Petroleum Company, McCullough Oil Corporation of California, J.M. Huber Corporation, and Husky Oil Company of Delaware.

[8] Midwest Oil Corporation, Kewanee Oil Company, Ashland Oil and Refining Company, Macdonald Oil Corporation, and Forest Oil Corporation.

plaintiffs; for the most part they did not participate substantially in the proceedings but they have adopted the position of the original plaintiffs. After the petition was filed, there appears to have been no substantial communication between the Pauley group and Interior with respect to the leases except in connection with the litigation, and except that plaintiffs paid their annual rent of $17,280 (per lease) until the basic five-year term of the leases expired in 1973.

Claimants have tried and present four theories of government responsibility: first, that by changing the lessees' standard of liability in February 1969, the Government frustrated the purposes of the leases; second, that if the liability standard had all along been "absolute liability," plaintiffs are entitled to restitution for mutual mistake because both sides were unaware that that was the standard; third, that the Government breached the leases by various acts; and, fourth, that the Government in effect took the leases by eminent domain and must pay just compensation.

II.

Jurisdiction

Before considering the merits, it is necessary to evaluate defendant's arguments that this court lacks jurisdiction over plaintiffs' two claims based on frustration and mutual mistake. The first of these positions is that the claim for rescission because of commercial frustration is really a type of declaratory judgment action, over which this court has no jurisdiction. *See United States v. King*, 395 U.S. 1 (1969). Defendant points to a paragraph of plaintiffs' petition stating that plaintiffs are willing to "* * * submit their interests in the leases to the jurisdiction of the Court and subject them to such orders as the Court deems fit and proper in the premises." It is said that this part of plaintiffs' claim is really a request for rescission and for a declaration of rights—a petition for a declaratory judg-

ment. But defendant blinds itself to the preceding paragraph of plaintiffs' petition on frustration, which asks for a monetary award of some $73 million in bonus payments and some sixty-nine thousand in rental fees for the two leases. This is clearly more than a mere request for declaratory orders by the court; it is a demand for a money judgment. Since plaintiffs found their express request for a money judgment on two of the jurisdictional bases of the Tucker Act—"any Act of Congress * * * or upon any express or implied contract * * *"—it is clear that this court has jurisdiction. 28 U.S.C. § 1491 (1976); *see Eastport S.S. Corp. v. United States*, 178 Ct. Cl. 599, 605, 372 F.2d 1002, 1007 (1967).

Moreover, the Government advances an erroneous syllogism:
1) The Supreme Court in *King* held that the Court of Claims has no jurisdiction to issue declaratory judgments;
2) In order to reach a judgment plaintiffs ask for a declaration of their rights under the leases;
3) A declaration of rights is a declaratory judgment and therefore the Court of Claims lacks jurisdiction.

The crucial flaw is, of course, the equation of a ruling on plaintiffs rights under the leases with a declaratory judgment. A declaratory judgment is a particular statutory remedy allowing a court to state the legal rights of the parties without regard to a monetary remedy or the grant of specific relief. Such monetary or specific remedy may later flow from the court's declaration, but it need not follow, and if it does it is a separate, subsequent offspring of the primary declaration. *See* 28 U.S.C. §§ 2201–2202 (1976); *Aetna Life Ins. Co. v. Haworth*, 300 U.S. 227, 241 (1937); *Skelly Oil Co. v. Phillips Petroleum Co.*, 339 U.S. 667, 671–72 (1950). The classic illustration of a declaration without regard for possible monetary remedies is *United States v. King*, 395 U.S. 1 (1969). There this court found that it could not grant a money judgment because King's monetary claim was time-barred under the statute of limitations. However, the court mistakenly thought that it could issue a declaration that King was entitled to a

change in his military retirement status. *King v. United States*, 182 Ct. Cl. 631, 633–34, 660–62, 390 F.2d 894, 896–97, 913–15 (1968), *rev'd*, 395 U.S. 1 (1969). Here, on the other hand, plaintiffs explicitly seek a monetary remedy—return of over 73 million dollars, or more. They are not asking for a simple declaration of rights in their leases which may or may not result in a subsequent payment of money outside of the court's processes. As we recognized in *Gentry v. United States*, 212 Ct. Cl. 1, 546 F.2d 343 (1976), merely because the court must make a ruling of law (in *Gentry*, declaring a statutory provision unconstitutional) in order to arrive at a money judgment does not render this court's decision a "delaratory judgment" banned under *King*. *See* 212 Ct. Cl. at 7–8, 546 F.2d at 345–46.

Defendant's second jurisdictional attack—that plaintiffs' claim for rescission because of mutual mistake or frustration is an equitable action—is based on the incorrect premise that the Court of Claims has no equity jurisdiction. This assumption we have previously described as an "ancient but inaccurate shibboleth." *Quinault Allottee Ass'n v. United States*, 197 Ct. Cl. 134, 138 n.1, 453 F.2d 1272, 1274 n.1 (1972). The correct postulate, as *Quinault* observed, is that this court has no jurisdiction to grant specific equitable relief. *Id.* This principle does not preclude the courts from exercising equitable powers as "an incident of our general jurisdiction." *Klamath & Modoc Tribes v. United States*, 174 Ct. Cl. 483, 488 (1966). Equitable doctrines can be employed incidentally to this court's general monetary jurisdiction either as equitable procedures to arrive at a money judgment, *Klamath & Modoc Tribes v. United States*, 174 Ct. Cl. 483, 490 (1966) (use of accounting to aid in rendering money judgment); *Quinault Allottee Ass'n v. United States*, 197 Ct. Cl. 134, 137–38 & n.1, 453 F.2d 1272, 1274 & n.1 (1972) (power to use class action procedures to arrive at money judgment), or as substantive principles on which to base the award of a money judgment. *See e.g., United States v. Milliken Imprinting Co.*, 202 U.S. 168, 173–74 (1906) (reformation of contract as basis of money judgment); *South Boston Iron Works v. United States*, 34 Ct. Cl. 174 (1899) (mutual

mistake in final written contract terms as basis for money judgment); *Iowa-Wisconsin Bridge Co. v. United States*, 114 Ct. Cl. 465, 504, 84 F. Supp. 852, 862-63 (1949), *cert. denied*, 339 U.S. 982 (1950) (reformation of deed to include reservation of defendant's easement as basis of money judgment).

As originally enacted, the Tucker Act specifically permitted the use of equity doctrines to arrive at a pecuniary judgment. The original version of the Act gave this court jurisdiction over all claims based upon the constitution, laws, regulations, or contracts with the United States "* * * in respect of which claims the party would be entitled to redress against the United States either in a court of law, *equity*, or admiralty * * *" Act of March 3, 1887 (Tucker Act), ch. 359, § 1, 24 Stat. 505 (emphasis added). The Supreme Court in *United States v. Jones*, 131 U.S. 1 (1888), held that this language did not cover the award of equitable *remedies*, but the Court also held that the statutory language allowed the court to consider equitable principles as a basis for awarding money judgments:

> It seems, therefore, that in the point of providing only for money decrees and money judgments, the law is unchanged, merely being so extended as to include claims for money arising out of equitable and maritime as well as legal demands. *Id.* at 18.

In *United States v. Milliken Imprinting Co.*, 202 U.S. 168 (1906), the Court, speaking through Mr. Justice Holmes, expressly held that under a "fairly liberal interpretation" of the then-existing Tucker Act, the Court of Claims had jurisdiction to reform a contract in order to arrive at a money judgment. *Id.* at 173–74. The particular language in the Tucker Act upon which both the *Jones* and *Milliken* courts relied, "* * * in respect of which claims the party would be entitled to redress against the United States either in a court of law, equity, or admiralty * * *", was omitted in the 1948 recodification, but the Reviser's Note clearly indicated that no substantive change was intended.[9]

[9] The Note, which can be relied upon in interpreting a statute, *Western Pacific R.R. Corp. v. Western Pacific R.R. Co.*, 345 U.S. 247, 254–55 & n.11 (1953), states that the quoted words: "* * * were omitted as unnecessary since the Court of Claims manifestly under this section will determine whether a petition against the United States states a cause of action." The note continued by stating that at any rate the Court of Claims no longer has admiralty jurisdiction (which is not at issue here). See Reviser's Note after 28 U.S.C. §1491 (1976).

This court has always construed the 1948 version of the Tucker Act as continuing the previously established use of equitable doctrines. *E.g.*, *Iowa-Wisconsin Bridge Co. v. United States*, 114 Ct. Cl. 464, 504, 84 F. Supp. 852, 862–63 (1949), *cert. denied*, 339 U.S. 982 (1950); *Klamath & Modoc Tribes v. United States*, 174 Ct. Cl. 483, 490 (1966). Often, the court has awarded (or denied) a money judgment based upon an equitable theory, without even discussing its jurisdiction. *See e.g.*, *Rash v. United States*, 175 Ct. Cl. 797, 804–05, 810–11, 360 F.2d 940, 944, 947 (1966) (mutual mistake in sale of land contract resulting in rescission; jurisdiction assumed); *National Presto Indus. Inc. v. United States*, 167 Ct. Cl. 749, 760–61, 767–69, 338 F.2d 99, 106–07, 110–11 (1964), *cert. denied*, 380 U.S. 962 (1965) (mutual mistake of fact; jurisdiction assumed); *McNamara Constr. of Manitoba, Ltd. v. United States*, 206 Ct. Cl. 1, 4–5, 509 F.2d 1166, 1167–68 (1975) (reformation of contract under theory of mutual mistake denied; jurisdiction assumed). This continued assumption that we can properly use equitable theories in passing upon suits for monetary awards is grounded firmly on the Tucker Act's history, on unquestioned Supreme Court cases and on Court of Claims decisions; we reaffirm both the practice and the principle.[10]

III

The merits

The two most significant dates in this case are the Union Oil well blow-out-and-spill on January 28, 1969, and plaintiffs' speedy institution of this action some two months later on April 9, 1969. The blow-out-and-spill created an immediate, major environmental emergency

[10] *See also* the discussion of this point in Judge Nichols' concurring opinion in *Mitchell v. United States*, Nos. 772-71, 773-71, 774-71, and 775-71, decided this day.

with serious political overtones; it evoked continuous and serious consideration by the Government, under great pressure, of the best course to pursue. Steps were first taken which proved tentative and later modified, but plaintiffs were not content to wait until the Government had had a fuller opportunity to plot its position. We analyze plaintiffs' theories of recovery in the strong light of the undeniable fact that in these circumstances the Pauley group allowed the Government only a short time in which to make its decisions before their petition to this court cried frustration, mistake, breach and taking.

A. *Frustration:* Plaintiffs' first and most strongly presented claim is that the promulgation on February 21, 1969 of a new regulation governing lessee liability for oil spills (30 C.F.R. 250.42(b), *supra*, Part I, B) imposed for the first time strict liability to the government and to third parties, and that this new standard, in conjunction with the independent collapse of the insurance market for oil spill damages,[11] profoundly frustrated the dominant purpose of their leases, after less than a year of their basic five-year terms. Accordingly, plaintiffs say, they are entitled on this ground to the return of the bonuses and rentals they paid to the Government (over $74,000,000).

We do not take up point-by-point the individual substantive arguments pressed by the parties.[12] To us, the decisive factors are that (a) both before and after the amendment of February 21, 1969, the standard of liability was uncertain and ambiguous, as was the application of the February 21st modification to existing leases like plaintiffs'; (b) the February change was under continuous review by Interior

[11] As noted in Part I, B, n.3, *supra*, there is no contention that the Government's modification of the liability regulation in February 1969 caused the disappearance of insurance for oil spills. Nor do plaintiffs claim frustration on the basis of the insurance collapse alone.

[12] For instance, defendant claims that state law, not federal regulations, governed the standard of liability for damages to third parties, and that the state law of California already imposed a strict standard of liability on oil drilling as an ultrahazardous activity. Plaintiffs respond that federal law established the standard of liability because federal regulations preempted state law standards, and that, even if state law controlled, under California law only oil drilling in inhabited areas is necessarily ultrahazardous.

and was in fact modified later in 1969; (c) other oil companies continued to operate in the Santa Barbara Channel in 1969 despite the February amendment and the insurance collapse; and (d) in the face of all these circumstances plaintiffs did not seek authoritative clarification or wait or push for the uncertainty to be cleared up, but rushed *in medias res* to this court with their full-fledged frustration claim. These elements (which we shall spell out in turn) add up to a failure of proof by plaintiffs that by the time the suit began (or thereafter) an unexpected contingency had occurred which rendered performance of their leases commercially impracticable.[13]

(a). The standard of lessee liability for offshore oil spills, prior to the February 1969 amendment, was plainly unsettled. California law might apply[14] and, if so, it was unclear what that law was (as shown by the differing interpretations by the parties, *see* n.12, *supra*, of the one decision on the matter by the Supreme Court of California, *Green v. General Petroleum Co.*, 250 Cal. 328, 270 P. 952 (1928)). To the uncertain extent federal law controlled, that was supplied by the Secretary's regulations under the

[13] Helpful guidelines for a frustration or impossibility claim are set forth in *Transatlantic Financing Corp. v. United States*, 363 F.2d 312 (D.C. Cir. 1966): (1) did an unexpected contingency occur; (2) was the risk of the contingency allocated between the parties, either expressly or by custom; (3) did the occurrence of the contingency render performance commercially impracticable? 363 F.2d at 315. *See also, Natus Corp. v. United States*, 178 Ct. Cl. 1, 371 F.2d 450 (1967). We concentrate in this case on the first and the third of these guidelines.

[14] Section 4(a)(2) of the Outer Continental Shelf Act [43 U.S.C. § 1333(a)(2)] stated that the civil and criminal laws of each adjacent state as of the effective date of the Act [August 7, 1953], shall be controlling "* * * [t]o the extent that they are applicable and not inconsistent with this act or with other Federal laws and regulations of the Secretary [of the Interior] now in effect or hereafter adopted * * *"

From the inception of the Act, commentators have noted that the determination of which state laws are "applicable and not inconsistent" and thus incorporated as the law of the United States under section 4(a)(2), is an open and controversial question. *See* Christopher, *The Outer Continental Shelf Lands Act: Key to a New Frontier*, 6 STAN. L. REV. 23, 42 (1953). Judge Skelly Wright, then a judge in the United States District Court for the Eastern District of Louisiana, commented that it was difficult to visualize a more uncertain area of the law than the choice of law for contract and tort problems in the outer continental shelf. Wright, "Jurisdiction in the Tidelands" in *Legal Problems in the Tidelands; A Symposium*, 32 TULANE L. REV. 173, 184–86 (1958).

Outer Continental Shelf Act, and their coverage was likewise ambiguous. 30 C.F.R. 250.30 (1969) stated that the lessee shall: "* * * take all reasonable precautions to prevent damage or waste of any natural resource or injury to life or property or the aquatic life of the seas." Section 250.40 further explicated the lessee's duty to control oil wells, subsection (a) requiring the lessee to take "all reasonable precautions" to control wells and subsection (b) mandating that the lessee adopt "all reasonable precautions" to prevent any well blowouts, and to exercise "due diligence" in controlling any blowout. The only specific mention of the lessee's duty to control pollution was contained in section 250.42, which said that the lessee: "* * * shall not pollute the waters of the high seas or damage the aquatic life of the sea or allow extraneous matter to enter and damage any mineral- or water-bearing formation." 30 C.F.R. § 250.42 (1969). None of the regulations or orders spoke directly to the standard of liability for damage to third parties through pollution or oil spills.[15]

Plaintiffs insist that these provisions imposed no more than liability for negligence, and that the February amendment established absolute liability toward the Government and third parties,[16] even though it did not use that term. In this broad interpretation of the amendment they are supported by a contemporaneous press conference statement by Secretary Hickel, but it is far from plain what a court would have decided if plaintiffs had seen fit to seek a declaratory judgment as to the amendment's

[15] The leases required the exercise of "reasonable diligence" in drilling and producing wells and required the lessees to carry out all reasonable government orders at their own expense "* * * [P]rovided, That the lessee shall not be held responsible for delays or casualties occasioned by causes beyond the Lessee's control." It was and is unclear whether this latter provision applied to anything more than the carrying-out of federal orders, or whether it covered liability to third parties at all.

[16] Liability to third parties, if absolute, would clearly be of much more concern to plaintiffs and to other Santa Barbara Channel operators. Plaintiffs refer to the "staggering potential liabilities" to third parties if absolute liability prevailed. In particular, they mention earthquakes causing oil spills. The San Andreas fault line runs fifty miles from the Channel area at one point, and there exists the possibility of a great earthquake in the region.

meaning or judicial review of the amendment. Certainly a substantial argument could have been made that the amendment, if it actually changed the standard of liability, should not and could not apply to existing leases like plaintiffs'.[17] Of course, we are not saying definitely that the amendment altered nothing for plaintiffs; all we suggest is that during February-April 1969, as before, there was sufficient doubt of the applicable standard of liability so to call for further exploration and further steps by plaintiffs before they could properly claim total frustration via an unexpected alteration in legal requirements.

(b). Also, in the spring of 1969 there was much concern in the oil industry over this February standard-of-liability amendment and it appears to have been under continuous review within the Interior Department. Early in May (after this suit had been brought) the Department announced a set of proposed amendments to 30 C.F.R. part 250, including the disputed section 250.42. 34 *Fed. Reg.* 7381, 7383 (1969). On August 22, 1969, after considering various comments submitted pursuant to this notice and a subsequent June notice, the Department promulgated amendments to 30 C.F.R. part 250. Concerning section 250.42, the preface stated that from the comments on 250.42(b) (*i.e.* the February amendment):

> * * * it appears that there is confusion and doubt regarding the original intent and purpose of the February 21, 1969, amendment to set forth in greater detail the existing responsibilities of an oil and gas lessee on the Outer Continental Shelf for the control and removal

[17] The February 1969 amendment to 30 C.F.R. § 250.42 (which added subsection (b)) stated only that the lessee was obliged to pay costs of cleanup and "reparation of any damage to whomsoever occurring." Whether this regulation would have been read by courts as preempting state tort law and imposing a new federal standard of strict liability on current leases is uncertain. Some legal commentators on the Santa Barbara oil spill assumed without discussion that state tort law governed liability to third parties for oil spill damages. *See* Note, *Pollution of the Marine Environment from Outer Continental Shelf Oil Operations*, 22 So. Car. L. Rev. 228, 237–39 (1970). Indeed, in one of Pauley's own contemporaneous memoranda there is language suggesting uncertainty as to the application of the February amendment. *See* n.5, in Part I, B, *supra*. Other oil companies apparently claimed that the new oil spill regulation did not apply to them since it was not existing at the time the leases were issued. *See* Nanda & Stiles, *Offshore Oil Spills; An Evaluation of Recent United States Responses*, 7 San Diego L. Rev. 519, 529 (1970).

of pollutant, and that the amendment has been misunderstood. Accordingly, to eliminate any doubt or confusion as to the original intent and meaning of the February 21, 1969, interpretive amendment to §§ 250.42 and 250.43(b) is further amended for the purpose of clarification, and a new paragraph (c) is added.

34 *Fed. Reg.* 13,544 (1969).

Section 250.42(b) [redesignated 250.43(b)] was amended with slight wording changes, and a new subsection (c) was added:

(c) The lessee's liability to third parties, other than for cleaning up the pollutant in accordance with paragraph (b) of this section, shall be governed by applicable law.

34 Fed. Reg. 13,547 (1969).

There has been no authoritative interpretation of this regulation, and we do not feel obliged to attempt one. It suffices for our purposes that if plaintiffs had waited for this change they might well have doubted that it established for them the new standard of absolute liability which they say they feared so much. At the least, they might well have sought an authoritative construction (e.g. through a declaratory suit) before taking the definitive step of announcing and acting as if the leases had been wholly frustrated by imposition of a new requirement that they assume absolute liability.

(c). Despite the February 1969 amendment and the collapse of the insurance market, other oil companies drilled and operated in the Santa Barbara Channel in the spring and summer and fall of 1969. *See* Part I, B, *supra*, Part III, C, 2, *infra*. Plaintiffs seek to minimize this fact by asserting that only the "major" oil companies could afford such risks, and the smaller companies like plaintiffs could not sustain the risk of drilling. This attempted distinction will not work, in part because the law requires an objective view of commercial frustration or impossibility—the fact that a risk makes the contract unreasonable for a particular party is no excuse. *See Restatement (Second) of Contracts*, § 281, comment e (Tent. draft No. 9, 1974); *Clark Grave Vault Co. v. United States*, 178 Ct. Cl. 52, 54–55, 371

F.2d 459, 461 (1967); 6 A. CORBIN, ON CONTRACTS § 1332. Further, while plaintiffs assert that only "major" companies with greater capital resources and technology were able to continue drilling, they make no attempt to show that the liabilities were so great and so threatening that any oil company other than one of the "seven sisters" could not afford to drill in the Santa Barbara Channel. Indeed, some of the plaintiffs, in their own annual reports published after promulgation of the "new" liability standard, indicated plans to continue drilling as soon as the temporary government "suspension" was lifted. At the time of these reports there was no indication that futher drilling was impossible due to excessive liability. The 1968 annual reports of Husky, Colorado's parent company, and Kewannee, all published in March 1969, indicate plans to continue drilling if the government lifted its "suspension." This suggests that at least some of the plaintiffs did not find the Government's "new" liability regulation so immediately prohibitive as to foreclose any possibility of drilling.

(d). In view of what we have recited thus far, little need be added to underline plaintiffs' undue haste in running to this court on April 9, 1969, with a claim of gross frustration through the February 21, 1969 amendment to the regulations. In February-April 1969 the situation was surely unclear, unsettled, and in flux. Neither the prior liability standard nor the February one was at all definite. But, as we have said, plaintiffs did not seek any authoritative clarification nor did they wait for the solution or the clarification which time could have brought. The result was that, when the petition was filed, there was and could be no proper showing that an unexpected change in the standard of liability had actually occurred for plaintiffs, or that their further performance had thereby been rendered commercially impracticable. Nor have events since April 9, 1969 shown the existence of these elements of their frustration claim. We do not say that plaintiffs necessarily had to wait for a complete and final resolution of the whole liability problem, but only that they could not correctly

claim frustration while it was legally so obscure that their standard of liability had increased at all[18]—and that, if it had, they were in commercial fact precluded from drilling and operating.

B. *Mistake:* Plaintiffs also present an alternative claim of mutual mistake which they say warrants rescission of the contracts and return of their bonus and rent payments. This contention is that, even if a strict standard of liability for oil spill damages existed at all relevant times in California and governed plaintiffs' operations, then both sides were mistaken at the time of the leases—both assuming (according to the claim) that a negligence standard controlled oil drilling liability in the Santa Barbara Channel.

The simplest answer to this point is that plaintiffs have failed to prove either that the absolute liability standard controlled (either under California law or under the federal regulations) when the leases were made in 1968, or that at that moment the Government thought that negligence was the proper standard. Our discussion, Part III, A, *supra*, on the frustration claim shows how indefinite and uncertain the entire subject was and continued to be. A claim of mutual mistake cannot find any footing in such spongy ground. On the contrary, relief for mistake should rest on a showing which is "clear and convincing." 13 S. WILLISTON ON CONTRACTS, (Third ed. 1957) § 1580.

In addition, the demand for rescission on the basis of mutual mistake sinks because plaintiffs have failed to prove any mistake as to a basic, fundamental, or central

[18] In the presence of all this doubt, this court, in which the frustration claim is pressed, cannot be expected to decide for itself, *post hoc* in 1979, that the standard of liability was in fact drastically raised in February 1969 and therefore that plaintiffs' frustration claim should now be sustained, looking backward to 1969. Decisions upholding claims of frustration through changes in the law have rested on an overwhelming showing that the alleged legal impediment actually existed at the pertinent time. *See Walker v. Continental Life & Accident Co.*, 445 F.2d 1072 (9th Cir. 1971); *West Los Angeles Institute for Cancer Research v. Mayer*, 366 F.2d 220 (9th Cir. 1966), *cert. denied*, 385 U.S. 1010 (1967). No such demonstration has been made here. A court asked, long after the event, to find frustration through an alleged change in the law should not be called upon to pick its own troubled way along very uncertain ground. The claim of frustration presupposes that the disabling change in the law was clear and definite at the time the suing party threw up its hands.

assumption of the contract. *See* 13 S. WILLISTON ON CONTRACTS, (Third ed. 1957) § 1584. "The court must be satisfied, that but for the mistake the complainant would not have assumed the obligation for which he seeks to be relieved." *Grymes v. Sanders*, 93 U.S. 55, 60 (1876). The standard of liability—especially as to third parties—has not been shown to us to be such a subject. The lease terms appear not to cover it, nor did the then regulations and Interior Department orders;[19] there was no consideration or discussion given by the parties to that issue when the leases were negotiated; and there is no demonstration that either party, let alone both, thought the issue central to the contracts. *See Grymes v. Sanders*, 93 U.S. 55, 60–61 (1876); *Tombigbee Constructors v. United States*, 190 Ct. Cl. 615, 622–23, 627, 420 F.2d 1037, 1040–41 (1970); *Hannah v. Steinman*, 159 Cal. 142, 149, 112 P. 1094, 1097 (1911). *Compare National Presto Industries, Inc. v. United States*, 167 Ct. Cl. 749, 763, 338 F.2d 99, 108 (1964), *cert. denied*, 380 U.S. 962 (1965) (parties explicitly negotiated new manufacturing process which was of critical interest to government; mutual mistake found) *with Tombigbee Constructors v. United States*, 190 Ct. Cl. 615, 623–24, 420 F.2d 1037, 1041 (1970) (no discussion of possible flooding of proposed barrow for backfill; no mutual mistake).

A related reason for rejecting plaintiffs' mutual mistake claim is the lack of any evidence (or even argument) that the availability of oil spill insurance was a basic assumption of the contract. Under plaintiffs' hypothesis it was the conjunction of a strict liability standard and the absence of procurable insurance that together made the risks of drilling unacceptably high. It is only a mistake about the applicable liability standard, joined together with a mis-

[19] Plaintiffs' attempt to avoid this conclusion by arguing that language implying a negligence standard—"reasonable diligence," "reasonable precautions"—appeared in the orders and the lease. However, none of the regulations, orders or lease terms to which plaintiffs advert appeared to deal with liability to third parties, and even for the government the adoption of a negligence standard (if state law called for absolute liability) was unclear. The references to "reasonable diligence" and "reasonable precautions" might not necessarily imply a negligence standard if state law was contrary.

take about the availability of insurance, that would suffice to show that the parties were mistaken about a basic assumption of the contract—the level of risks in drilling. But plaintiffs have not shown or argued that either party made the continued availability of insurance a basic assumption of the contract.[20]

C. *Breach:* Plaintiffs' claim for total breach of contract has three prongs: (1) the Interior Department's failure to act on plaintiffs' application of February 11, 1969, for permission to drill a second well on tract 384; (2) Secretary Hickel's clearance procedures, which plaintiffs characterize as a "sham" and camouflage for an indefinite suspension of operations, and (3) the February 19, 1969 amendment to the regulations (already discussed) which plaintiffs say imposed for the first time a strict liability standard.

1. Reliance on the first two matters is practically foreclosed by the trial judge's factual conclusion (which we accept) that

> * * * plaintiffs have not intended since mid-March 1969, after considering the new liability regulation issued by Secretary Hickel, to conduct further drilling operations on subject tracts, and that this is the reason why they failed to pursue the Department of the Interior's clearance procedures to permit future drilling operations, and why they failed to file an application for a permit to do further drilling in compliance with the requirements of OCS order No. 10.
>
> Finding 78(k).

This finding is well supported by the prior findings and by the record (*see* Part I, A, B, *supra;* Part III, C, 2, *infra*)—and we do not and should not overturn it. *See Davis v. United States,* 164 Ct. Cl. 612, 616–617 (1964). Under this conclusion, plaintiffs cannot well contend that they were hurt either by the failure to act on their drilling application or by the clearance procedures.

2. In any event, we are satisfied that Interior's conduct with respect to plaintiff's operations was both authorized and reasonable during the period from the Union Oil blowout on January 28, 1969 to the institution of this suit on April 9, 1969—and that thereafter Interior could properly assume that plaintiffs desired to litigate, rather than to drill or operate.

We must start, on this facet of plaintiffs' petition, as on the others, from the undeniable premise that the blowout on January 28th created an important emergency in the area of the Santa Barbara Channel. The oil spill covered some fifty square miles, causing extensive damage to the heavily populated coasts and to the marine ecosystem. This ecological disaster evoked great popular concern in the region, and the Federal Government obviously had to review its position and consider what to do.

The Secretary had broad power, under the Outer Continental Shelf Act, to prescribe necessary rules and regulations, including "such rules and regulations as he determines to be necessary and proper in order to provide for the prevention of waste and conservation of the natural resources of the outer Continental Shelf, and the protection of correlative rights therein, and, notwithstanding any other provisions herein, such rules and regulations shall apply to all operations conducted under a lease issued or maintained under the provisions of this subchapter." 43 U.S.C. § 1334(a)(1) (1970).[21] Both this court and the Ninth Circuit have already considered the Secretary's powers under the Act and have concluded that it grants him considerable, though not plenary, authority to suspend drilling operations or regulate leases in the interests of

[20] Plaintiffs also raise a secondary argument: even if the government was not mistaken, plaintiffs are entitled to rescission because the government made representations that the standard of liability was negligence. This argument lacks any merit. The facts do not indicate that the government made any representation, explicit or implicit, as to third party tort liability. Further, plaintiffs' allegation of a government "misrepresentation" is far removed from the types of misrepresentations which induced a private party's reliance and therefore produced a ruling of rescission in previous cases. *See Staten Island Hygenia Ice & Cold Storage Co. v. United States,* 85 F.2d 68, 71 (2d Cir. 1936); *Timber Investors, Inc. v. United States,* No. 61-75, slip op. at 5 & n.2 (Ct. Cl. Nov. 15, 1978); *Tree Preservation Co. v. United States,* 172 Ct. Cl. 577, 581 (1965).

[21] The wording "conservation of natural resources * * *" has been correctly construed to give the Secretary power to consider all natural resources of the outer continental shelf, not just mineral resources. *Gulf Oil Corp. v. Morton,* 493 F.2d 141, 144–45 (9th Cir. (1973); *Union Oil Co. of Cal. v. Morton,* 512 F.2d 743, 749–50 (9th Cir. 1975).

conservation. *See Sun Oil Co. v. United States*, 217 Ct. Cl. ____, 572 F.2d 786, 802 (1978) [*Sun Oil*]; *Union Oil Co. of Cal. v. Morton*, 512 F.2d 743, 747–48 (9th Cir. 1975) [*Union Oil*]; *Gulf Oil Corp. v. Morton*, 493 F.2d 141, 144 (9th Cir. 1973) [*Gulf Oil*].[22]

It is within this statutory framework that we must evaluate plaintiffs' claim of breach because Interior failed to act, before this suit was brought, on their application (filed February 11, 1969) to drill a well on tract 384. Under the contractual provisions and practices, as well as under the Administrative Procedure Act and established law, the Department certainly had a reasonable time in which to respond. *See Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786 (1978).[23]

---

[22] The then regulations provided for the suspension of operations "* * * in the interests of conservation" 43 C.F.R. 3383.5(a) (1969) or where the operations endanger life or threaten immediate and serious damage to "the leased deposits or other valuable mineral deposits" 30 C.F.R. 250.12(b) (1969). This latter provision was amended, in August 1969, specifically to include "aquatic life," "the environment," and "property."

[23] The APA sections cited by plaintiffs, section 9(b), 5 U.S.C. § 558(c) (1976) and section 6(d), 5 U.S.C. § 555(e) (1976), if applicable, both provide the Government with a reasonable time. Section 558(c), which applies to any "license required by law," states that the agency "* * * *within a reasonable time*, shall set and complete proceedings required to be conducted in accordance with sections 556 and 557 of this title or other procedures required by law and shall make its decision." (emphasis added). Similarly, section 555(e) requires "prompt notice" of any denial of a request in "any agency proceeding." This provision, even if otherwise applicable, governs only denials of applications, and Interior did not deny plaintiffs' application. Although an indefinite refusal to act might at some point constitute a "denial", that point was not reached here. Also, the standard of "prompt notice" in itself allows the Government a reasonable time to respond. *Cf. King v. United States*, 492 F.2d 1337, 1345 n.27 (7th Cir. 1974) (indicating that district court on remand should allow agency flexibility in meeting requirements of section 555(e) to prevent delay of parole board decisions).

The cases plaintiffs cite as establishing a contractual obligation for a timely and good faith response, *George A. Fuller Co. v. United States*, 108 Ct. Cl. 70, 69 F. Supp. 409 (1947), and *Wah Chang Corp. v. United States*, 151 Ct. Cl. 41, 282 F.2d 728 (1960), also assume a "reasonable time" standard. The court in *Fuller* expressly distinguished its facts (Government failure to timely furnish promised materials) with "*reasonable delays* due to making changes * * *." 108 Ct. Cl. at 100, 69 F. Supp. at 414 (emphasis added). In *Wah Chang*, the court found an even broader exception to the "quick response" standard urged here by plaintiffs—sovereign actions taken by the United States for the greater public good. 151 Ct. Cl. at 50–51, 282 F.2d at 734. Also *see Tri-Cor, Inc. v. United States*, 198 Ct. Cl. 187, 220–21, 458 F.2d 112, 131 (1972) (what is "reasonable delay" depends on circumstances of particular case) *cited in Sun Oil Co.*, 217 Ct. Cl. ____, 572 F.2d 786, 804 (1978); *id.* at ____, 572 F.2d at 805 n.26.

On the record before us, we have to conclude that the delay here, in view of the crisis produced by the oil spill, was reasonable.[24] After the spill, there was a need to gather and evaluate additional data on the environmental risks of drilling in the Santa Barbara Channel. Secretary Hickel's temporary suspension of drilling and task force review of each lease was justified by the then-existing circumstances and fully supported by the subsequent enactment of the National Environmental Policy Act of 1969 (effective January 1, 1970). 42 U.S.C. §§ 4321–4332 (1976); *see Union Oil*, 512 F.2d 743, 749–50 (9th Cir. 1975). Such an environmental review takes time, as we noted in *Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 804–05 & nn. 25–27 (1978). As in *Sun Oil*, we find no support for the view that Interior's delay in this case was overly long. Pauley's February 11th application was received in the local Interior office on February 17, 1969, and held in abeyance pending the Department's environmental review. By March 1, 1969, Secretary Hickel sent a telegram to all lessees requesting additional geological data, and on March 25th OCS Order No. 10 (*see* Part I, B, supra) was promulgated, establishing new standards for drilling applications.[25] By April 1, 1969, the Secretary cleared some of the leases he had suspended from operations in February.

In sharp contrast to the steady progression of the Interior Department's review is plaintiff's own conduct. Pauley did not respond to the Secretary's March 1st telegram requesting information until early April, just before suit, and even then gave only a partial reply (*see* Part I, B, *supra*); and in Pauley's correspondence in March with the Interior regional office the lessees made no mention of or inquiry about the February drilling application. Further, they made no attempt to inquire about the

---

[24] To repeat what this court has earlier observed concerning a similar delay: "The point, which plaintiffs [Sun Oil, et al.] seem to lose sight of, is that the blow out gave rise to a 'whole new ball game.' " *Sun Oil*, 217 Ct. Cl. at ____, 572 F.2d 786, 804 n.24 (1978).

[25] OCS Order No. 10 terminated a prior order setting standards for drilling permits, OCS Order No. 2. Although Order No. 10 was not made expressly retroactive, plaintiffs made no attempt to inquire into the order's application to Pauley's February 11th application. *See* Part I, B, *supra*.

possible application to their permit request of the newly-promulgated OCS Order No. 10. *See* note 25, *supra*. Then, on April 9th, this suit was abruptly begun, and Interior could rightly assume (particularly since plaintiffs did not indicate otherwise) that the February 11th drilling application was no longer being pressed.

Plaintiffs also see a breach in the special clearance procedure initiated by the Secretary in February 1969. These procedures, as we have said, involved the collection of additional physical data by a federal task force, a review of the particular lease with recommendations to be forwarded to Washington, where the Secretary himself would decide whether to clear the lease. Once cleared, the lessees could then apply for further drilling permits from the regional office, which could grant permits under the standard procedures. *See* Part I, B, *supra; cf. Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 802–03 & n. 19 (1978). Plaintiffs describe these procedures as a "sham" and a facade to cover "arbitrary and *ad hoc*" bureaucratic actions, concealing Interior's shutdown of all future drilling. This description of Interior's procedures is a gross mischaracterization, lacking the clearly convincing evidence required to refute the presumption of government regularity and good faith. *See United States v. Chemical Foundation, Inc.*, 272 U.S. 1, 14–15 (1926); *Librach v. United States*, 147 Ct. Cl. 605, 612 (1959); *Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 805 (1978). Not only do plaintiffs fail to present clear and convincing evidence of government deceit but the evidence points to a diligent, albeit slow, government review. By April 1, 1969, within two months of Secretary Hickel's February 7th telegram suspending the five operating leases, clearance was granted on four of the five leases. Clearance for the fifth suspended lease, delayed by the lessee's slowness in supplying additional information, was subsequently granted. *See Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 802–05 (1968) (description of same—or very similar—review process for Sun Oil Company).

Plaintiffs then say that, even if clearance was granted, this was meaningless because no one was actually allowed to drill. As a factual matter this is incorrect. *Sun Oil* found

that Sun Oil's platform drilling was resumed on its leases on July 21, 1970; that Union Oil was allowed to drill to drain certain reservoirs in June and July of 1969; and that Phillips Petroleum was allowed to resume drilling permanently on its lease in April 1969. 217 Ct. Cl. ____, 572 F.2d 786, 797–98, 800, 805 n.27.[26] Later on, there were suspensions for other reasons but subsequent actions by Interior as to other lessees with potentially different oil spill problems do not indicate that the whole program was a facade from the beginning. There are decisions involving subsequent drilling delays by the Department, finding that at least parts of those delays were valid. *See Gulf Oil*, 493 F.2d 141, 146–48; *id.* at 149 (petition for rehearing denied) (9th Cir. 1973); *Union Oil*, 512 F.2d 743, 746, 751–52 (9th Cir. 1975). In any case, whether other oil companies were later prevented from drilling after their clearance was granted is now irrelevant—the present plaintiffs did not even try for the preliminary clearance and have no grounds to complain of Interior's actions beyond the clearance stage.

Much is made of the Interior Department's supposed failure to tell the Pauley group, despite its inquiries, what was actually required for clearance. But we are satisfied (see Part I, B, *supra*, and Part III, C, *supra*) that plaintiffs made no real effort either to find out the requirements or to comply with those demands which it knew to exist. None of the minor items of federal omission cited by plaintiffs—all before the start of this litigation on April 9th—show that the Pauley group was unable to obtain the necessary information if it had really wanted to.[27] Even if

---

[26] Plaintiffs attempt to distinguish these drilling resumptions by stating that until 1974 no drilling was allowed in the "politically sensitive mid-Channel area" seaward of Santa Barbara, and all drilling which was allowed was in areas located in the "extremities" of the Channel. However, the Union Oil drilling took place on the Dos Cuadras field, the very field that was the site of the January 1969 blowout that polluted Santa Barbara beaches. Not only is the Dos Cuadras field physically closer to Santa Barbara, but a more "politically sensitive" area is hard to conceive. *See Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 798 (1978). In any event, plaintiffs cannot escape the ultimate fact that at least some companies which obtained clearance were able to resume operations. If plaintiffs had gone through the required procedures for clearance and still not been allowed to drill, we might have a different case.

[27] It is unclear whether the clearance procedures should have been published

we put to one side our conclusory finding that after mid-March 1969 plaintiffs no longer wished to drill (*see* Part III, C, 1, *supra*), the underlying findings leave the greatest doubt that plaintiffs were interested in March-April 1969 in pursuing any further drilling or oil operations.

3. A separate aspect of the breach claim is the February 21, 1969 change in the regulations which is said to have suddenly imposed the absolute liability standard for the first time. Reasoning similar to that which supports our denial of the frustration claim (Part III, A, *supra*) impels us to reject this breach claim as well. In the short period between February 21st and April 9th (when this suit began), the situation was so fluid and so unclear, the wording and application of the amendment so uncertain, that plaintiffs could not properly deem their contracts totally breached by the mere promulgation of the new regulation. At the time they began this action so hastily, plaintiffs could not properly say or show that the mere publication of the new regulation actually changed their liability or even if it might have that that change was more than purely theoretical or merely temporary, without real impact on their operations or their contracts—in short, the change, if any, in the standard of liability was not so definite, nor did it have so direct an impact, as to be an anticipatory breach of the leases. And events since the litigation began have not improved plaintiffs' position on that score.

Even if the Government had expressly and clearly imposed, in February 1969, a new standard of absolute liability and that new standard had been plainly applicable to pre-existing lessees like plaintiffs, we would not think that the lease-contracts had been violated. The contention of breach invokes a lease provision that the lease was subject to the Outer Continental Shelf Act and "* * * to all *lawful and reasonable regulations* of the Secretary of the Interior * * * *when not inconsistent with any express and*

under the Administrative Procedure Act or the Freedom of Information Act, as amended, 5 U.S.C. § 552(a)(1) (1976). However that may be, plaintiffs cannot claim a total breach-of-contract because of such a failure; they could have obtained the information if they had wished to press their February drilling application.

specific provision herein, which are made a part hereof" (emphasis added). But plaintiffs' 1968 leases (even as read to incorporate the then-existing regulations) did not expressly or specifically cover the problem of liability for oil spills—especially not the standard of responsibility for damage to third parties. *See* Part III, A and B, *supra*. Accordingly, a new regulation explicitly establishing absolute liability would not be "inconsistent with any express and specific provision" of the leases.[28]

We also have to take it, on the present record, that such an express regulation would be "lawful and reasonable." As we have pointed out, the Continental Shelf Act provides:

> The Secretary may at any time prescribe and amend such rules and regulations * * * in order to provide for the prevention of waste and conservation of the natural resources of the outer Continental Shelf * * * and, notwithstanding any other provisions herein, such rules and regulations shall apply to all operations conducted under a lease issued or maintained under the provisions of this subchapter. 43 U.S.C. § 1334(a)(1) (1970).

The Ninth Circuit, faced with precisely the same lease provision in *Union Oil*, held that it did not preclude the Secretary from issuing new regulations and applying them to current leaseholders, but that the Secretary could not cancel a lease based on a violation of a new regulation. 512 F.2d at 748–49. In *Sun Oil* this court analyzed the same lease provision and concluded that the Secretary would be liable under the lease only if his actions constituted an "* * * unbridled, unjustified and unreasonable interference" with lease rights. 217 Ct. Cl. at ____, 572 F.2d at 802. Plaintiffs have not shown that in the circumstances here—assuming, as we now do, that neither the leases nor the original regulations covered the topic of the standard of liability—the creation of absolute liability for pre-existing

[28] If we are wrong and such a new regulation would be inconsistent with the lease or with the prior law, then the new regulation would be unenforceable against plaintiffs and the latter could defend against claims based on the new regulation. We do not consider that mere promulgation of such an unforceable and invalid regulation would be enough for the lessees to declare a total breach of the leases.

leases would be an unjustified or unreasonable interference by the Government with those contracts. The widespread dangers of massive oil spills had been emphasized by a series of accidents, the latest of which was the Union Oil blowout. Plaintiffs do not tell us that the conservation and waste provisions of the Act would fail to support such a regulation in this situation, and we can presume that there would be adequate statutory authorization. The truth is that the major problems an existing lessee might encounter from such an express creation of a new standard of absolute liability would flow, not from the new regulation itself, but from the absence of insurance—a problem for which in this case the Government was in no way responsible.

D. *Taking*: Plaintiffs likewise maintain that the Secretary's new regulations and clearance program (which they perceive as totally suspending all rights to use their leases) constituted a fifth amendment taking of the leases. It suffices in answer that, even if we accepted plaintiffs' characterization of the facts (which, as discussed above, we do not), there could be no such taking. Plaintiffs fail to meet at least one of the prerequisites for a constitutional taking—the requirement that the taking be authorized by Congress. In order to establish a constitutional taking, plaintiffs must show that the officer committing the alleged taking has either express or implied legislative authority to take the property. *See, Hooe v. United States*, 218 U.S. 322, 335–36 (1910); *United States v. North American Transp. & Trading Co.*, 253 U.S. 330, 333 (1920); *Regional Rail Reorganization Act Cases*, 419 U.S. 102, 127 n.16 (1974); *Coast Indian Community v. United States*, 213 Ct. Cl. 129, 147–48, 550 F.2d 639, 649 (1977); *Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 819 (1978). *See generally*, 2 NICHOLS' THE LAW OF EMINENT DOMAIN, § 6.1 at 3–4 (rev. 3d ed. 1976).

Here, the Outer Continental Shelf Act contains no authority for the Secretary to take property by completely and indefinitely halting all drilling (as plaintiffs' claim that Secretary Hickel did). Section 12(c) provides the only express power for the Secretary of the Interior to suspend

all operations, but this applied only during a war or national emergency upon a recommendation by the Secretary of Defense. 43 U.S.C. § 1341(c) (1970); *see Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 819 (1978).[29] Sections 5(b) and 8(i) allow the Secretary to cancel leases, but only for violations of regulations in force at the time of the lease issuance or upon proof of fraud in the transaction. 43 U.S.C. § 1334(b) (1970); *id.* at § 1337(i); *see Union Oil*, 512 F.2d 743, 747–48 (9th Cir. 1975). Nor is there any implication of a congressional authorization to the Secretary to suspend all drilling indefinitely. The Ninth Circuit in *Union Oil* concluded:

> Although 30 C.F.R. § 250.12 provides expressly that a "suspension" shall be limited in time only by the Secretary's judgment that the environmental threat has ended, and although 43 U.S.C. § 1334(a)(1) authorizes regulations providing not only for suspensions but for any other action affecting operations which the Secretary determines "necessary and proper" and "conservation of natural resources," Congress clearly did not intend to grant leases so tenuous in nature that the Secretary could terminate them, in whole or in part, at will. [footnote omitted]. 512 F.2d at 750.

The Court of Appeals concluded that the Secretary had no implied authority to condemn leaseholds or to prohibit their beneficial use: "But Congress no more impliedly authorized the Secretary to take the leasehold by prohibiting its beneficial use than by condemnation proceeding. A suspension for which the fifth amendment would require compensation is therefore unauthorized and beyond the Secretary's power." 512 F.2d at 751.[30] *Sun Oil* quoted parts of the *Union Oil* decision and agreed with the Ninth Circuit's holding. 217 Ct. Cl. ____, 572 F.2d 786, 819 (1978).

---

[29] Although the 1978 amendments to the OCS Lands Act (not applicable here) do provide a new, broader authorization for cancellation of leases, the Secretary's power is carefully circumscribed. *See* Outer Continental Shelf Lands Act Amendments of 1978, Pub. L. No. 95–372, § 204, 92 Stat. 629, 636–40 (to be codified in 43 U.S.C. § 1334).

[30] Although the court in *Union Oil* went on to discuss whether the Secretary's actions in that case constituted a "taking," this language was not inconsistent with the court's earlier analysis of the authority issue. *Cf. Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 819 n.50 (1978).

There is no reason to alter our conclusion. Plaintiffs cite some other statutes as a possible basis of the Secretary's authority, but these have no pertinence.[31] Nor is this a case in which there has been legislative ratification of theretofore unauthorized activity. It follows, even on the erroneous assumption that the Secretary suspended plaintiffs' operations indefinitely and entirely, that there was no constitutional exercise of the eminent domain power.

We have found that the Secretary did in fact suspend plaintiffs' drilling rights for a very short period, but we have also held (*see* Part III, C, *supra*) that such a temporary suspension was authorized by the Outer Continental Shelf Act and reasonable in the circumstances. *See Sun Oil*, 217 Ct. Cl. ____, 572 F.2d 786, 802 (1978); *Union Oil*, 512 F.2d 743 (9th Cir. 1975); *Gulf Oil*, 493 F.2d 141, 144 (9th Cir. 1973). This short, temporary suspension was plainly not so severe a property deprivation as to constitute a fifth amendment taking. *See United States v. Central Eureka Mining Co.*, 357 U.S. 155, 168 (1958); *Johnson v. United States*, 202 Ct. Cl. 405, 479 F.2d 1383 (1973); *cf.* 43 C.F.R. § 3383.5(a) (1969) (providing for abatement of rents and royalties and extension of the lease term during a suspension ordered by the Secretary).[32]

E. *Partial breach claim:* On April 10, 1978, after this case was ready for oral argument, plaintiffs belatedly filed a motion to add a fifth count for recovery for a *partial* breach. The counts on which the case had been earlier tried and briefed were either for rescission, or taking, or a total

[31] *E.g.*, 40 U.S.C. § 257 (1976) grants any officer of the government power to acquire land by condemnation "In every case in which the * * * [officer] has been, or hereafter shall be, *authorized* to procure real estate for the erection of a public building or for other public uses * * *" (emphasis added). Independent authority must be shown. 16 U.S.C. § 760f (1976) did provide the Secretary of the Interior (now transferred to the Secretary of Commerce) with authority to acquire lands, but only for the purpose of that subchapter—studying migratory marine fish.

[32] Plaintiffs have not asked for a refund of the proportionate part of the rents for 1969 attributable to the period from February 11, 1969 (when they filed their drilling application) to April 9th (when they commenced the suit), and therefore we need not consider whether 43 C.F.R. § 3383.5(a) (1969) applies to this situation. Nor, for obvious reasons, have plaintiffs sought a comparably short extension of their basic five-year lease-terms which expired in 1973.

breach.[33] The new partial breach claim was based on the supposition that, although the Government had completely suspended all drilling in 1969 for an indefinite period, by 1974 the Government had lifted its suspension in reaction to the decisions in *Gulf Oil* and *Union Oil*, and to the energy crisis. According to plaintiffs, this alleged suspension from 1969 to 1974 allows them to recover, if not for a total breach, then for a partial breach; compensation for such a partial breach, they say, would be delay damages (said to be some 39 million dollars), plus an extension of their leases for the over four-year length of the asserted suspension. Defendant vigorously objects to the proposed amendment, and because of the motion's lateness the matter is within the court's discretion. We do not stop to weigh whether we should exercise that discretion in plaintiffs' favor because our discussion of the original claims of total breach shows that the new demand for partial breach is also without merit. The factual predicate of the new claim is that the Government suspended all drilling in the Santa Barbara Channel from 1969 until 1974, and we have already rejected that position insofar as plaintiffs are concerned. The motion to amend is therefore denied.

IV.

Summary

Each of the legal theories advanced by plaintiffs is ultimately premised on a single basic perception of the circumstances—that the Secretary's new liability regulation, alone or together with the Department's inaction on the Pauley group's drilling application and the Departmental clearance program, effectively shutdown plaintiff's drilling and operations in the Santa Barbara Channel for an indefinite period. It is on that hypothesis that plaintiffs justify their filing of this suit so relatively soon after the Union Oil blowout late in January 1969. We have come to a

[33] The claims for *total* breach we have considered and rejected above in Part III, C.

different conclusion—that the liability regulation of February 1969, the delay in acting on plaintiffs' drilling application, and Interior's clearance program were all interim and temporary reasons, not unreasonable in the situation at that time, which were taken in the immediate aftermath of a major environmental disaster in the Channel and did not absolutely or indefinitely foreclose future operations by plaintiffs. On this view, all of plaintiffs' claims—whether frustration, mutual mistake, total or partial breach, or taking—must fail.

True, plaintiffs paid some 73 million dollars plus annual rent for leases with a minimum five-year term and drilled only for eleven months, but this unhappy result was ultimately the product of their own rush to this court. Plaintiffs did not try to ascertain the effect on them of the new liability regulation nor did they wait to see if (as in fact actually happened within six months) the government might change the ambiguous regulation. They did not attempt to comply with the new clearance procedures in an attempt to have their leases cleared (as did other Channel lessees). They did not pursue their drilling application. Instead, in the midst of a transition period of great uncertainty, they quickly made the worst possible interpretations of the government's actions and came at once to this court with claims that the lease-contracts were wholly at an end and that they were entitled to receive back their entire investment, at the least, and possibly over 300 million dollars in lost future profits.

As a court of law, we cannot give plaintiffs any relief because they had no legal rights, vindicable here, when they brought suit, and have not acquired any in the course of the litigation. Perhaps the legislative or executive branches could, as a matter of grace or policy, extend their lease-terms to permit them to drill further (if they still wish to) in the effort to discover oil in commercial quantities, but of course we cannot take that step.[34]

[34] Congress has recently amended the Outer Continental Shelf Lands Act to deal with some of the problems which have surfaced in this litigation. Congress established a fund to pay for oil spill cleanup costs and damage liabilities to private third parties; the President was also directed to review whether private oil pollution insurance was reasonably available. Outer Continental Shelf Lands Act Amendments of 1978, Pub. L. No. 95-372, §§ 301-305, 92 Stat. 629, 670-78 (1978).

For the reasons given in this opinion, we hold that plaintiffs are not entitled to recover and that their petition must be dismissed.

CONCLUSION OF LAW

Upon the foregoing opinion and upon the findings, the court concludes as a matter of law that plaintiffs are not entitled to recover and that the petition is dismissed.

ITEM B

Order of Court of Claims
dated January 24, 1979
(Amending Certain Findings)

IN THE UNITED STATES COURT OF CLAIMS

No. 197-69

PAULEY PETROLEUM, INC., ET AL

v.

THE UNITED STATES

Before DAVIS, NICHOLS, KUNZIG, BENNETT AND SMITH, Judges, en banc

ORDER

This case comes before the court on its own motion, and this order has relation to footnote number one which appears in the opinion rendered this date by the court.

IT IS ORDERED this date that said footnote is amended by adding at the end of the first sentence thereof the following phrase: "with minor modifications."

IT IS FURTHER ORDERED that the modifications therein referred to are those as set forth in the attached appendix to this order.

BY THE COURT

Oscar H. Davis
Judge, Presiding

January 24, 1979

APPENDIX

Modifications to trial judge's findings as provided for in the court's opinion of this date:

1) Finding 19(f) at p. 12: Strike entirely and replace with: " In 1968 Secretary Udall created a buffer zone seaward of the state sanctuary. The government excluded oil leasing and drilling activities from this area. In 1969, after the Union Oil blowout, Secretary Hickel renamed the initial buffer zone a "Federal ecological preserve" and designated additional areas as a new buffer area."

2) Finding 61(g), table at p. 68: Strike table entirely and replace with attached table.

3) Finding 70(o) at p. 111: At line 6 strike figure of "$2,196,787" and replace with figure of "$2,916,787."

4) Finding 70(o)(5) at p. 113: At line 3 strike "1.3 and 1.5 percent" and replace with "13 and 15 percent."

5) Finding 72(f) at p. 117: At line 14 omit comma after word "channel" and replace with period. Strike the following remaining language on lines 14-16:". . . and as late in his tenure as September 15, 1970, that channel lessees had not drilled because they had not been granted permits."

6) Finding 75(b) at p. 122: At line 23 omit comma after word "changes" and replace with period. Strike remaining language in that sentence: ". . . and also a copy of Pauley's letter of protest about the new regulation."

Tract 375

	Oil Barrels		Gas (thousand cubic feet)	
	Total Primary & Secondary	Primary	Total Primary & Secondary	Primary
South Structure				
Middle Pico				
South flank				
1st zone	18,540,814	(12,265,050)	2,961,651	(7,137,666)
2nd zone	2,452,903	(1,585,500)	755,014	(1,222,897)
3rd zone	12,409,992	(7,999,118)	5,363,011	(6,616,676)
North flank				
1st zone	11,610,050	(7,962,304)	1,149,866	(3,870,017)
2nd zone	6,861,567	(4,480,200)	1,745,728	(3,148,249)
3rd zone	7,666,334	(4,892,477)	2,845,967	(4,193,531)
Upper Repetto				
North flank	9,891,173	(7,199,843)	8,156,336	(12,837,975)
Upper Miocene				
South flank	232,772,143	(140,701,033)	133,552,024	(235,557,420)
Monterey				
South flank	137,322,075*	(137,322,075)	186,758,000	(186,758,000)
North Structure (within 375)				
Upper Repetto	51,011,907	(30,125,142)	See n.**	(72,835,899)
Upper Miocene	55,205,875*	(55,205,875)	168,316,583	(168,316,583)
Sespe	43,261,512*	(43,261,512)	185,737,228	(185,737,228)

Tract 384

North Structure (within 384)				
Upper Repetto	91,712,570	(54,303,496)	See n.**	(130,328,390)
Upper Miocene	22,879,250*	(22,879,250)	69,756,287	(69,756,287)
Sespe	16,024,092*	(16,024,092)	68,796,772	(68,796,772)

* The reservoirs in these productive horizons are not considered to be receptive to secondary recovery operations. Thus, figures shown in the column headed "Total Primary & Secondary" are the same as those in the column headed "Primary".

** Total primary and secondary gas reserves for Tracts 375 and 384 in this formation in the North Structure are 103,133,472 MCF.

ITEM C

Order of Court of Claims dated April 6, 1979

(Denying rehearing)

A-41

IN THE UNITED STATES COURT OF CLAIMS

No. 197-69

PAULEY PETROLEUM, INC., ET AL

v.

THE UNITED STATES

Before DAVIS, Judge, Presiding, NICHOLS, KUNZIG, BENNETT AND SMITH, Judges, en banc

ORDER

This case comes before the court on plaintiffs' motion, filed March 2, 1979, for rehearing pursuant to Rule 151(b), with reference to the opinion entered herein on January 24, 1979, dismissing the petition. Upon consideration thereof, together with the response in opposition thereto, without oral argument.

IT IS ORDERED that the plaintiffs' said motion for rehearing be and the same is denied

BY THE COURT

Oscar H. Davis
Judge, Presiding

April 6, 1979

ITEM D

Report of Trial Judge dated March 19, 1976

IN THE UNITED STATES COURT OF CLAIMS
TRIAL DIVISION
No. 197-69
(Filed: March 19, 1976)

PAULEY PETROLEUM INC., COLORADO OIL AND GAS CORPORATION, MESA PETROLEUM CO., McCULLOCH OIL CORPORATION OF CALIFORNIA, J. M. HUBER CORPORATION, and HUSKY OIL COMPANY OF DELAWARE,

Plaintiffs,

MIDWEST OIL CORPORATION, ASHLAND OIL AND REFINING COMPANY, KEWANEE OIL COMPANY, MACDONALD OIL CORPORATION, and FOREST OIL COMPANY,

Involuntary plaintiffs,

v.

THE UNITED STATES

Defendant.

REPORT OF TRIAL JUDGE TO THE COURT

John P. Chl, attorney for plaintiffs. H. Richard Schumacher, of counsel. John P. Chl attorney for Ashland Oil and Refining Company and Macdonald Oil Corporation; James W. McDade, attorney for Forest Oil Company; Walter Perry Dornaus, attorney for Kewanee Oil Company; Oscar E. Swan, Jr. and Charles Bruce, attorneys for Midwest Oil Corporation.

Myles E. Flint and John H. Germeraad, attorneys for defendant, with whom were Assistant Attorney General Kent Frizzell and Deputy Assistant Attorney General Walter Kiechel, Jr.

FINDINGS OF FACT

Pursuant to the order of the court dated November 10, 1975, HOGENSON, Trial Judge, finds the following facts:

1. Plaintiffs who commenced this suit by filing their petition on April 9, 1969, are corporations, with office locations as follows:

Pauley Petroleum Inc. (Pauley), Los Angeles, California;
Colorado Oil and Gas Corporation (Colorado), Denver, Colorado;
Mesa Petroleum Co. (Mesa), Amarillo, Texas;
McCulloch Oil Corporation of California (McCulloch), Los Angeles, California, now named McCulloch Oil Corporation;
J. M. Huber Corporation (Huber), Denver, Colorado;
Husky Oil Company of Delaware (Husky), Calgary, Alberta, Canada, formerly Husky Oil Company.

Huber is a New Jersey corporation. The others are Delaware corporations.

2. (a) The petition alleges that five other corporations own partial interests in one

or both of the two oil and gas leases subject of this suit. Such corporations, herein called involuntary plaintiffs, and their office locations, are as follows:

Midwest Oil Corporation (Midwest), Fort Worth, Texas;
Kewanee Oil Company (Kewanee), Tulsa, Oklahoma;
Ashland Oil & Refining Company (Ashland), Oklahoma City, Oklahoma, now Ashland Oil, Inc.;
Macdonald Oil Corporation (Macdonald), Dallas, Texas;
Forest Oil Corporation (Forest), Denver, Colorado.

They are corporations respectively of Nevada, Delaware, Kentucky, Delaware and New York.

(b) Defendant's answer filed July 25, 1969, admits the alleged partial ownerships of these five involuntary plaintiffs, and asserts that they are indispensable parties to this suit.

(c) On motion of the original plaintiffs, the court caused notices to be served on the five involuntary plaintiffs, advising them

of the pendency of this action and directing them to appear and assert their interests.

(d) By appropriate pleadings, filed between September 11, and October 13, 1969, each of them appeared, asserting partial ownership of one or both of the leases, and requesting that if an award be made in favor of the original plaintiffs, a like award be made for such involuntary plaintiff in proportion to its interest in the leasehold tracts.

(e) The present interests of the plaintiffs in each of the leases are as hereinafter detailed.

3. (a) The two oil and gas leases, suoject of this suit, were entered into on March 1, 1968, between Pauley and certain other plaintiffs, as lessees, and defendant, as lessor, acting by its Bureau of Land Management, Department of the Interior.

(b) The leases, numbered OCS-P-0218 and OCS-P-0226, cover respectively tracts 375 and 384 of submerged lands on the Outer Continental Shelf in the Santa Barbara Channel off the coast of California. Each tract is three miles

square, containing 5,760 acres. Tract 384 lies adjacent to 375 to the north. They form together a rectangular area of 18 square miles, 6 miles long and 3 miles wide.

(c) The original lessees and their respective percentange interests in the leases were as follows:

Lessee	Tract 375	Tract 384
Pauley	25.341	31.250
Colorado	15.340	15.625
Huber	12.500	15.625
Husky	12.273	10.000
Midwest	12.273	12.500
Kewanee	10.000	2.500
Ashland	12.273	12.500
	100.000	100.000

Pauley's respective interests in the two tracts included a 10 percent interest in each of them, being held by Pauley in its name for J. Ray McDermott, Inc. (McDermott).

4. (a) Subsequent to the execution of the leases, various assignments were made of interests therein. Such assignments were authorized by the terms of the leases, and promptly approved by defendant.

(b) In April 1968, Pauley assigned portions of its interest in tract 375 to Macdonald and Mesa.

(c) In April 1968, Kewanee exercised its option to expand its interest in tract 384 to 10 percent, and accordingly, Pauley, Colorado, Huber, Ashland and Midwest assigned portions of their respective interests in that tract to Kewanee.

(d) In March through May 1968, Pauley assigned portions of its interest in tract 384 to Mesa, Macdonald McCulloch and Forest.

(e) In October 1968, Pauley assigned the 10 percent interest in each of the leases, which it was holding for McDermott, to the latter's subsidiary, TransOcean Oil, Inc. (TransOcean).

(f) After these 1968 assignments, the lessees and their percentage interests in tracts 375 and 384 were as follows:

Lessee	Tract 375	Tract 384
Pauley	8.841	6.000
Colorado	15.340	12.500
Mesa	2.500	2.500
McCulloch	-0-	2.500
Huber	12.500	12.500
Husky	12.273	10.000
Midwest	12.273	10.000
Kewanee	10.000	10.000
Ashland	12.273	10.000
Macdonald	4.000	4.000
Forest	-0-	10.000
TransOcean	10.000	10.000
	100.000	100.000

5. (a) In March 1969, TransOcean sold and assigned its 10 percent interest in tract 375 for a total price of $50,000 in varying proportions to Pauley, Mesa and Macdonald.

(b) In March 1969, TransOcean sold and assigned its 10 percent interest in tract 384 for a total price of $50,000 in varying proportions to Pauley, Forest, Mesa, McCulloch and Macdonald.

(c) In October 1969, Kewanee sold and assigned its 10 percent interest in tract 375 in varying proportions to Pauley, Husky, Mesa, Colorado, and Macdonald for a total price of $25,000.

(d) Since the last of the above-mentioned assignments, the percentage interests of the various plaintiffs (original and involuntary) in tracts 375 and 384 have been and now are as follows:

Plaintiff	Tract 375	Tract 384
Pauley	21.001	8.789
Colorado	17.340	12.500
Mesa	5.500	3.500
McCulloch	-0-	3.662
Huber	12.500	12.500
Husky	14.273	10.000
Midwest	12.273	10.000
Kewanee	-0-	10.000
Ashland	12.273	10.000
Macdonald	4.840	4.400
Forest	-0-	14.649
	100.000	100.000

6. (a) The ocean waters of the Santa Barbara Channel extend some 70 miles in an east-west direction. They are bounded on the north by the California mainland coast extending from Point Conception on the west to the city of Ventura on the east.

(b) Santa Barbara, California, is located on this stretch of coastline, about 25 miles west of Ventura.

(c) East of Santa Barbara, the coast curves southeasterly to Ventura, and then extends southerly, forming the eastern boundary of the channel.

(d) At the southeastern end of the channel lies its entrance from the south, where the channel waters are about 10 miles wide, lying between Port Hueneme on the mainland coast and Anacapa Island.

(e) The southern boundary of the channel is marked by an east-west string of islands, fairly close in succession, first Anacapa, and in turn to the west, Santa Cruz, Santa Rosa and San Miguel Islands.

(f) All of these islands are parts of California.

(g) From its entrance between Port Hueneme and Anacapa Island, the channel broadens immediately to distances of from 20 to 30 miles between each of the other islands and the California mainland coast.

(h) At is western end, where tne mainland coast turns northerly at Point

Conception, the channel opens broadly into the Pacific Ocean.

7. (a) A prolonged controversy existed between the United States and California concerning title to the submerged lands in the Santa Barbara Channel, and defendant did not undertake to lease any of such lands until 1966.

(b) In 1947, the Supreme Court held that the United States, not California, held title to the lands underlying the Pacific Ocean seaward of the ordinary low-water mark on the coast of California, outside of inland waters. United States v. California, 332 U.S. 19, 787, 804 (1947). The Court expressly stated that the basic difference between the parties was which government, federal or state, had the rights in and power of control of vast quantities of oil and gas underneath the submerged lands.

(c) The term "inland waters" was not defined, and shortly litigation ensued between the United States and California as to whether the Santa Barbara Channel and other waters were

such. While this case was still pending, two significant Federal statutes were enacted.

(d) In 1953, by the Submerged Lands Act, 67 Stat. 29, the United States made a general cession to each state with an ocean coastline (Atlantic, Pacific, or Gulf of Mexico) of submerged lands offshore within 3 miles, or as far beyond that as a state's boundary extended offshore when such state became a member of the Union. California thus acquired title to those lands extending 3 miles under the Pacific Ocean from its coastline. The term "coastline" was defined in part as meaning "the line marking the seaward limit of inland waters".

(e) In the same year, by the Outer Continental Shelf Lands Act, 67 Stat. 462, the United States declared that it held title to those shelf lands seaward from the submerged lands ceded to the various coastal states by the Submerged Lands Act. The Secretary of the Interior is and was authorized to lease such lands on the Outer Continental Shelf thus established. The legislative history shows that the Congress had the basic purpose to

provide a leasing policy to encourage the discovery and development of the oil potential of such lands, and the Act directs the Secretary of the Interior to prescribe rules and regulations relating to leasing of such lands and as to operations under any such lease.

(f) In 1965, the Supreme Court decided the case involving the Santa Barbara Channel, and on January 31, 1966, issued its formal decree. The Court held and decreed that the channel was not "inland waters," and that the United States held title to the channel's submerged lands, except that California owned those contiguous to its mainland coast and to the coasts of its islands bordering the channel, within the 3-mile limit provided by the Submerged Lands Act. United States v. California, 381 U.S. 139 (1965), 382 U.S. 448 (1966).

(g) The Outer Continental Shelf in the channel is fringed on the north and east by the 3-mile limit of California submerged lands off its mainland coast, and on the south by such limit off its border islands. Along and around such islands, the 3-mile limit is a continuous, though irregular, line, because the islands in succession are less than 6 miles

apart. Of course, the OCS lands extend out of the channel at its southeast entrance and also at the broad western expanse of the channel into the main body of the Pacific Ocean.

8. (a) The first lease sale by defendant of a submerged tract on the Outer Continental Shelf in the Santa Barbara Channel occurred on December 15, 1966. This was a special sale of one tract, authorized by Secretary of the Interior Udall and advertised for bids, pending completion of a general program for lease sales of Federal tracts in the channel.

(b) The tract involved was located immediately adjacent to a California submerged tract off the mainland coast from Carpinteria, a coastal community intermediate between Santa Barbara and Ventura. Standard Oil and Atlantic-Richfield, as lessees of the California tract, were producing oil from a field, known as Carpinteria Offshore (sometimes Serena), which underlay both tracts. This field was discovered in 1966.

(c) To avoid drainage of oil from the Federal portion of the field by continuing

production from wells on the California tract, defendant conducted a sale of its tract.

(d) Phillips Petroleum, Continental Oil and Cities Service, with a high bid of $21,189,000, obtained lease OCS-P-0166 covering the tract.

(e) Pauley, Colorado and Huber, and two other oil companies, submitted an unsuccessful bid on such tract.

9. (a) Pursuant to a California statute enacted in 1955, which authorized the state to lease lands up to 3 miles offshore, California leased a number of submerged tracts along the mainland coast of the Santa Barbara Channel.

(b) Prior to that time, production of oil had occurred from offshore extensions of four mainland fields, Rincon, Summerland, Elwood and Capitan, with wells drilled from the shore. The first two were located between Ventura and Santa Barbara, and the latter two a few miles west of Santa Barbara.

(c) California's first offshore production platform was set in place above the waters of the Santa Barbara Channel over the newly discovered Summerland Offshore oil field in 1958. The tract involved is located offshore (within the 3-mile limit) between Carpinteria and Santa Barbara, adjacent to the one on which the Carpinteria Offshore field was discovered in 1966.

(d) Several additional offshore fields (oil or gas) were discovered in the 3-mile belt seaward of the channel's mainland shore -- Gaviota (gas) in 1958; Cuarta (oil) and Conception (oil) in 1959; Naples (gas) in 1960; Coal Oil Point (oil) in 1961; Alegria (oil); Caliente (gas) and Molino (gas) in 1962; and South Elwood (oil) in 1966. These fields are spaced offshore along the mainland coast between Santa Barbara and Point Conception.

10. (a) About 60 natural seeps of oil and gas have existed for many years offshore and along the margin of the Santa Barbara Channel between Ventura and Point Conception.

(b) The major seepage is off Coal Oil Point, a few miles west of Santa Barbara, where 16,250 barrels of oil escape into the waters each year. Near the shore at Santa Barbara are eight of such seeps. A concentration of seeps exists off Point Conception. Five seeps occur in the channel near the border islands.

11. (a) During and prior to the bidding period, and after the OCS channel general lease sale, it was commonly known that earthquake and shipping hazards existed in the channel with respect to petroleum exploratory and developmental activities.

(b) The channel is a seismically active area, having two major faults and numerous minor ones. One of the major faults is the Oakridge fault which crosses subject tract 384, as hereinafer described. Since 1900, the channel has experienced numerous minor earthquakes, and two in excess of magnitude 6 on the Richter scale.

(c) In mid-1968, a swarm of relatively small earthquakes occurred in the eastern half of the channel, and about a dozen of them were

of magnitude 4, or larger, with the largest scaling 5.2.

(d) Earthquakes of magnitude 6 or more are expected to occur within the channel area, with several of such events within the next century. At or near its epicenter, such an earthquake has the force, directly by vibration or by causing ground ruptures, sea waves, landslides or turbidity of water currents, to destroy or seriously damage man-made structures, and to fracture or break underground entrapment structures of oil pools, permitting oil to rise and escape into the channel waters. Such an earthquake could sever well casings, fracture submerged pipelines, dislodge wellhead installations, and destroy or damage platforms.

12. (a) The established coastwise shipping lanes along California traverse the Santa Barbara Channel. As mapped and promulgated by the United States Coast Guard, the northbound and southbound lanes are each 1 mile wide, with a 2-mile strip between them. The northbound lane, being the closer of the two to the mainland, passes about 1/2 mile south of the southern edge of tract 375.

(b) The channel sometimes experiences heavy fogs and occasionally storms causing high seas.

(c) During drilling operations on tract 375, freighters passed close to the drilling vessel involved.

13. (a) The channel area has in general a mild climate. Beaches and other recreational facilities exist along the coasts of Santa Barbara and Ventura Counties, the two mainland counties bordering the channel, with scenic mountainous terrain near the sea.

(b) The tourist trade is large. Boating, surfing and sport fishing are major attractions. Commercial fishing operations are substantial.

14. The channel area is a wildlife habitat. Many seals and sea lions populate the channel islands. Numerous grey whales migrate northward through the channel in February and March and southward in November and December.

15. (a) The Federal leases accomplished on the Outer Continental Shelf in the channel cover most of the eastern half.

(b) In the western half, there is a large central area of unleased lands, fringed on the north and south by east-west zones of leased tracts, each extending between the central area and the 3-mile limit of California submerged lands.

(c) Defendant's leased tracts have water depths in the main on the order of magnitude of 250 feet, being shallower toward the shore, but progressively deeper toward the unleased central area where water depths plunge to 1,800 feet.

(d) Subject tract 384 has water depths increasing from 220 to 340 feet from northeast to southwest. Subject tract 375 has water depths of 300 feet in its northeast quarter, increasing to about 360 feet in its central area, progressively deeper south-southwesterly to a maximum of 750 feet in the extreme southwest corner.

(e) The leased lands on the Outer Continental Shelf in the Gulf of Mexico have considerably shallower waters and extend much farther offshore than the Federal tracts in the Santa Barbara Channel.

16. (a) Following the determination in 1965 that defendant owned the Outer Continental Shelf lands in the channel, the Department of the Interior undertook to develop a plan for the development of the oil and gas resources generally believed to exist in such lands.

(b) Considerations prompting early Federal action were that the Pacific Coast region was an oil deficit area dependent upon oil imports from the Gulf Coast, from Alaska, and from overseas to complete requirements, that the troubled state of affairs in the Middle East threatened continued supplies of oil on the world market, and there existed a great need for additional Federal revenues to meet the demands of the Vietnam War and to finance domestic programs.

17. (a) Prior to 1965, California had authorized, and a number of oil companies had

drilled "core holes" in the OCS lands of the channel. Such holes varied in depth from 3,000 to 6,000 feet. A "core hole" is a relatively shallow exploratory well, the logging of which provides clues as to the nature of the underground formations. The data obtained under the California program was available to some, but not all, potential bidders for Federal leases.

(b) To avoid competitive disadvantage, the Department of the Interior in November 1965 authorized a "twinning" program whereby oil companies drilled 53 "core holes," duplicating to that extent those previously permitted by California. Each twin hole was located within 100 feet of the state hole, and was limited to the same depth.

18. (a) On December 29, 1966, Secretary of the Interior Udall caused a notice to be published in the Federal Register, asking oil companies to nominate or designate in a non-binding way Federal tracts in the channel, which would be of interest to them in bidding for leases. The purpose was to furnish a guide to defendant in determining what tracts to offer for lease. On February 27, 1967,

Pauley, after consultation with Colorado and Huber, nominated tracts 375 and 384 among others.

(b) At the same time, the Secretary issued a press release which stated that leases resulting from nominations would carry adequate safeguards for protection of natural beauty and aquatic life in the offshore area.

19. (a) Ecological and aesthetic factors were considered by defendant in planning the general lease sale.

(b) Secretary of the Interior Udall made inquiries of his staff concerning possible effects of earthquakes on drilling operations in the channel. He received what he deemed adequate assurances in that regard.

(c) At two meetings held at Santa Barbara, California, and at Washington, D.C., Interior officials met with and heard the views of Santa Barbara representatives. Assistant Secretary Moore, head of the Mineral Resources Division which included the Geological Survey responsible for administration of leases on the

Outer Continental Shelf, made a tour by helicopter along the mainland coast of the channel, and observed the platforms over the state submerged lands, as well as the one on the Federal drainage tract. He saw what he described as slicks or sheens on the water, which he ascribed to oil from natural seeps.

(d) California had established and was maintaining, without any leasing, the Santa Barbara Oil Sanctuary, a 16-mile stretch of its 3-mile strip of submerged lands along the coastal area of Santa Barbara. City representatives expressed concern that Federal leasing of tracts adjacent to the state sanctuary would result in construction of platforms which would spoil the beauty of the area. They urged establishment of a Federal reserve area seaward of the state sanctuary.

(e) Another factor considered by Interior officials, which was discussed with California state officials, was that operation of any wells on adjacent Federal tracts would drain oil from any reservoir extending under the state sanctuary.

(f) Secretary Udall established the Federal Ecological Preserve and the Federal Buffer Zone, which in succession extended a few miles seaward from the state sanctuary. Some tracts in such areas were nominated by various oil companies, but not offered for sale, except for one tract, on which bids were received and rejected by defendant.

20. (a) The Santa Barbara Channel general lease sale, as recommended by Assistant Secretary Moore and approved by Secretary Udall, was accomplished in early 1968 after competitive bidding.

(b) The official notice of "Oil and Gas Lease Sale," published in the Federal Register on December 23, 1967, called for submission by February 6, 1968, pursuant to section 8 of the Outer Continental Shelf Lands Act, 67 Stat. 462, 468, 43 U.S.C. § 1337, and the regulations issued thereunder, 43 C.F.R., part 3380, of sealed bids to the Manager, Pacific Coast Outer Continental Shelf Office, Bureau of Land Management, Los Angeles, California, for the lease of oil and gas in 110 numbered and described tracts in the Santa Barbara Channel. Subject tracts were included.

(c) The notice indicated that the lease agreement would be the Bureau of Land Management's standard form 3380-1 (February 1966).

(d) The notice provided that a separate bid was to be submitted for each tract, that bids would be considered on the basis of the highest cash bonus offered for a tract, to be not less than $15 per acre, and that defendant reserved the right to reject any and all bids even though they exceeded such minimum. The notice further stated that leases would provide for a royalty rate of one-sixth, and a yearly rental or minimum royalty of $3 per acre. It also stated:

> All leases issued pursuant to this offer will be subject to the special conditions of Geological Survey Supervisory Order No. 9, which provides that platforms will be of sufficient size to accommodate 20 or more wells and that platforms will be of acceptable design, properly camouflaged, and subject to such other conditions as may be prescribed to protect

aesthetic values. Operations under such leases will also be subject to provisions for the protection of fishing operations and aquatic values.

The referenced order became Pacific Regional OCS Order No. 9 on January 3, 1968, when promulgated over the signature of the Supervisor, Pacific Region, Oil and Gas Branch, United States Geological Survey.

(e) With respect to various designated tracts located in the western half of the channel, the notice provided that the lessee would be subject to the stipulation that lessee assumes all risk of damage to persons and property on the leased premises, which occurs by reason of activities of defendant being conducted as a part of activities of the Air Force Western Test Range, regardless of fault or negligence by defendant, and whether or not based upon any concept of strict or absolute liability or otherwise; and that lessee agrees to indemnify defendant against any such claims.

(f) The Air Force Western Test Range was located at Vandenberg Air Force Base in the

vicinity of Point Conception. The tracts made subject to the stipulation were 24 or more miles west of plaintiffs' tracts 375 and 384.

21. (a) The lease sale was held, as scheduled, on February 6, 1968, and defendant's Bureau of Land Management shortly issued leases covering 71 tracts in the Santa Barbara Channel, and collected aggregate bonus payments of $602,719,261.

(b) The leased tracts were generally the same size and shape as plaintiffs' tracts, being each 3 miles square, containing 5,760 acres. Variations were due generally to the irregularity of the 3-mile limit lines of the California tracts.

(c) Following the sale, Secretary Udall issued a press release, extolling the investment by the petroleum industry of its money and talent in the development of the domestic resource base in a period of concern over the balance of payments posture of the United States, stating that undoubtedly much of the competition in the sale stemmed from a realization that new domestic supplies were

needed for a burgeoning domestic energy market, particularly significant in the crude deficit region of the Pacific Coast, and commenting that the Santa Barbara Channel area had been under intensive geologic investigation for several years, that more was known about it than any comparably sized area along the entire coast of the United States, and that competitive interest is significantly heightened when sound geologic data is available to indicate high mineral potential.

22. (a) Pauley and the other original lessees of subject leases submitted the highest bids of $43,503,147 and $30,351,447 respectively on tracts 375 and 384, which were accepted by defendant. These amounts, recited in the leases as consideration therefor, were paid, at or before the execution of such leases, to defendant by Pauley on behalf of itself and the other lessees.

(b) In addition, each lease required payment in advance of an annual rental of $3 per acre for 5,760 acres, or $17,280 per year.

(c) Prior to each of the first four lease years, commencing respectively on March 1

of 1968, 1969, 1970 and 1971, Pauley paid to defendant, on behalf of itself and the other lessees, the respective annual rentals for each tract. Thus, the total advance payments of rentals paid on each tract amount to $69,120.

(d) At the conclusion of the trial of this case, the annual rental payments for the fifth year of the primary terms of subject leases had not become due and had not been paid.

(e) For the third and fourth lease years, commencing respectively on March 1 of 1970 and 1971, each rental payment was made "without prejudice to the rights of the lessees," and defendant cashed the payment checks without comment.

23. (a) Prior to incorporation in 1959, the Pauley company was owned and operated by Edwin W. Pauley as an individual. In 1950 and 1951, he conducted seismic surveys in the Point Conception area of the channel. In 1956, his company was the operator for a group, including Petroleum, which explored California channel lands within the 3-mile limit along the mainland

coast. Pauley ran some 900 miles of seismic surveys of such submerged lands between Santa Barbara and Point Conception, drilled about 100 core holes in that area to depths of 2,000 to 3,000 feet, employed geologists to dive and recover about 2,000 rock samples from the ocean floor, and had geologists prepare mappings of onshore areas adjacent to such channel lands.

(b) In 1958, the Pauley-Phillips group obtained California oil and gas leases of two tracts of such channel lands, tract A about 15 miles west of Santa Barbara, and tract E near Point Conception, and in 1962, a lease covering tract 9A several miles west of tract A.

(c) Pauley discovered the Naples gas, the Conception oil and the Molino gas fields, previously mentioned, respectively on tracts A, E and 9A. Prior to acquisition, Pauley drilled seven and five core holes respectively on tracts A and E. After acquisition, Pauley drilled seven and 12 exploratory wells respectively on tracts A and E. The third well drilled on tract A was a discovery well. Tract

9A has four producing gas wells, completed on the ocean floor, with pipelines to shore.

(d) Pauley's previous experience in offshore oil exploration included operations off the coasts of Mexico and Louisiana in the Gulf of Mexico, off Long Beach, California, and in the Persian Gulf.

24. (a) In anticipation of a Federal leasing program, Pauley in 1966 entered upon an extensive program exploratory of the OCS lands in the Santa Barbara Channel.

(b) On December 14, 1966, Pauley entered into a joint venture agreement with Colorada and Huber covering this program. Pauley made available to Colorado and Huber exploratory data which it had already acquired, and the three agreed to share in proportion to their respective interests the costs of further exploratory operations in the channel area.

(c) Pauley held a 3/4 interest, and Colorado and Huber each a 1/8 interest in the joint venture. Pauley was reserved the right to have additional joint venturers share its interest.

(d) Pauley was designated as the operator of the program. The agreement stated that Pauley's total costs on the exploratory program to October 1, 1966, were $1,466,555. As agreed, Colorado and Huber reimbursed Pauley in proportion to their respective shares, and each paid Pauley $183,200.

(e) The joint venture agreement provided the terms of an operating agreement to become effective if leases were obtained.

25. (a) From February to the fall of 1966, pursuant to the Federal "twinning" program, Pauley and other companies participated with Continental Oil Company, with the latter as operator, in drilling 22 core holes in the eastern half of the channel, acquiring total core hole information of 96,000 feet.

(b) From December 1966 to February 1967, Pauley joined with Texaco in drilling five twin core holes, and with Mobil for three core holes, all in the eastern half of the channel.

(c) In addition, information relating to other core holes was obtained by Pauley by trades with other companies. Pauley had data on a total of 76 core holes in the OCS channel lands prior to its bidding in February 1968. Eight of such holes were drilled on or near tracts 375 and 384.

(d) Pauley had available and used the sonic electric, the induction electric, and the density electric logs, the mud logs and the dipmeter logs, all made in the drilling of the core holes, and also analyses of sidewall samples made, and paleontologin reports of cuttings and oher samples to determine age of the rocks at varying depths.

26. (a) In 1966 and 1967, Pauley ran some 2,300 miles of seismic survey lines extending east-west and north-south over the Federal channel lands, except in the deep central area in the western half of the channel. Seismologic interpretations were prepared from the soundings made and recorded. On tracts 375 and 384, the original survey lines were

1/2 mile apart in a grid pattern, and some additional lines were run.

(b) Seismologists use seismic data to make a determination as to the structural configuation and depths of subsurface rock layers, and this is submitted to geologists to aid them in deciding whether geologic structures exist which could entrap oil. Pauley employed that procedure generally, and particularly as to tracts 375 and 384.

(c) The survey vessel tows seismic equipment, which includes an energy source, such as an electric arc, which at intervals of a few seconds emits a wave of energy which penetrates the ground through successive rock layers. At each of the successive interfaces between rock layers, part of the energy of the wave is reflected, due to velocity change, and is returned to geophones, or receivers, also being towed by the vessel.

(d) Recordings are made of time lags between each emission and its successive reflections. As the vessel moves along a prescribed course, variations in such time lags indicate changes in the depths of rock layers.

(e) Only primary reflections, each having a direct course from the energy source to a particular interface and back to the receiver, are usable in the seismic mapping. The interpretation of the seismologist is complicated by the necessity to eliminate multiple reflections which in their courses have gone back and forth between interfaces, reverberations between the bottom and the surface of the sea, diffractions, refractions, ghosting and random noise. The seismologist makes adjustments to his mapping, called migrated sections, because of the return at an angle of primary reflections from an inclined rock layer, to show the true vertical position of soundings.

27. (a) Dr. Burdette A. Ogle, Ph.D in geology, 1951, University of California (Berkeley), was retained in January 1967, by the Pauley-Colorado-Huber group, and made a study of the onshore part of the Ventura Basin extending 50 miles eastward from the Santa Barbara Channel, from the north margin of the basin into the Santa Monica Mountains. The area studied had a large number of producing oil wells.

(b) The channel is the offshore extension of the Ventura Basin, which is a large east-west sedimentary basin with its onshore areas to the north and east of the channel. The basin is bounded on the north by the Santa Yenz Mountains, on the east by the San Gabriel Mountains, on the south by the Santa Monica Mountains, with the southern boundary extending through the channel islands, and with the western boundary coterminous with the western end of the channel. The basin is characterized by anticlinal trends and large reverse faults, extending in an east-west direction, and some 60 fields along such trends are or have been producing oil, with the majority of production being onshore.

(c) In his study, Dr. Ogle obtained detailed infomation as to the geologic trends on shore, which might be projected as continuing offshore into the channel. Such information concerned types and depths of rock layers, their contour features, such as anticlinal, synclinal, faulted, or otnerwise, and the existence of sands and trapping structures He used the records of 100 wells, selected from 200 which had been drilled in the area of study.

(d) An expert petroleum geologist, specializing in the finding of oil and gas, Dr. Ogle had had considerable experience in handling petroleum exploration programs, was managing partner of a firm of consulting geologist, a leader in various associations of petroleum geologists, and author of publications in that field. He had extensive experience in the study of the Santa Barbara Channel, surrounding onshore areas, and other oil-producing areas of Southern California.

(e) In January 1967, he had completed preparation of a composite map of the regional structural trends and oil fields in the Ventura Basin, showing projections of some of the trends into the Santa Barbara Channel. On such map, he marked four areas in the channel, which he concluded offered the best potential for offshore exploration, one of such areas covering the locations of tracts 375 and 384.

(f) With the aid of Robert N. Hacker, another consulting geologist, Dr. Ogle spent 7 months on the study for the Pauley group, and in September 1967, submitted 20 large sheets of drawings, which set forth 13 cross sections of

geologic structural formations across the basin, structure mapping, and stratigraphic correlation charts prepared from well logs.

(g) Dr. Ogle's submissions and his consulting services were used by the Pauley group in the preparation of bids on tracts 375 and 384, as well as other tracts.

(h) Dr. Ogle had brought Huber into the Pauley group in 1966, and he then obtained and now holds a 2 percent interest in Huber's share of gross sales of oil and gas from each of subject leases. After the execution of such leases, he provided consulting services to Huber, Midwest, Colorado and Forest on the drilling operations conducted by Pauley, as operator, on tracts 375 and 384.

28. (a) Absent an unconformity in a particular location, due to erosion or lack of continuity of deposition, the successively deeper strata or geologic formations and their respective ages of deposition in the Ventura Basin, and particularly in the Santa Barbara Channel, are as follows:

Formation	Age
Upper Pico	Pleistocene
Middle Pico Lower Pico Upper Repetto Repetto	Pliocene
Upper Miocene Monterey Rincon Topanga-San Onofre	Miocene
Vaqueros Sespe Alegria	Oligocene
Llajas	Eocene

(b) Dr. Ogle advised the Pauley group that the Sespe formation had major potential for offshore production of petroleum, that all three Pico and the Repetto formations were prime objectives, and that the Upper Miocene, fractured Monterey, Topanga, Vaqueros, and Eocene formations had potential for offshore production. His advice was based upon his study for the Pauley group, and upon his knowledge from previous investigations that oil fields in or near the Ventura Basin were producing from various of such formations.

29. (a) The West Montalvo oil field, which has produced 30 million barrels of oil with ultimate yield expected to be 50 million, islocated on the mainland coast of the channel, partially offshore, a few miles south of Ventura, California, and about 15 miles east of tracts 375 and 384.

(b) The Oakridge fault extends along the northernmost edge of this field and continues offshore across the northern part of tract 384.

(c) The Oakridge-Montalvo trend is one of two major onshore anticlinal trends which extend east-west through the Ventura Basin into the channel, each passing through mainland oil fields. The Oakridge-Montalvo passes through the West Montalvo field and the subject tracts, extending through the eastern half of the channel.

(d) Lying to the north of the Oakridge-Montalvo trend, the Rincon trend is the other major onshore-offshore trend. Just before entering the channel, the Rincon trend passes

through three adjacent coastal oil fields, the Ventura Avenue, the San Miguelito, and the Rincon, the latter being partially offshore, and then continues westerly in succession through the offshore Carpinteria (sometimes Serena), the offshore Dos Cuadras, and other offshore oil fields in the northernmost part of the channel to Point Conception.

(e) The major syncline of the Ventura Basin extends east-west and lies between the Rincon trend on the north and the Oakridge-Montalvo trend on the south, both onshore and offshore.

(f) Four other significant east-west anticlinal trends in the Ventura Basin are the Three-Mile, the Five-Mile the Pitas Point, and the Simi-Oxnard trends. The first two named are short trends in the western half of the channel, a few miles off the mainland coast, and to the south of but near the Rincon trend in that area.

(g) The Pitas Point trend is also a relatively short trend located in the eastern half of the channel, with no indications of

onshore existence, but it is closely parallel to the Rincon trend, immediately south thereof, and north of the major syncline.

(h) The Simi-Oxnard trend, with only probable projections into the channel along the channel islands, is a major east-west onshore anticlinal trend, extending south of the Oakridge-Montalvo trend. On the Simi-Oxnard is the Oxnard oil field, located to the southeast of the west Montalvo field, with other oil fields easterly on the trend.

(i) There has been substantial production of oil and gas from the Rincon trend, both onshore and offshore, from the Oakridge-Montalvo onshore, and from the Simi-Oxnard onshore, with some from the offshore Three-Mile trend. There has been no production from the offshore Pitas Point and Five -Mile trends, although discoveries of oil and gas have been made on the latter.

(j) The South Mountain oil field has been the most productive on the Oakridge-Montalvo trend, with 121 million barrels produced. The Rincon has been the most productive of the trends in the basin. Its Ventura Avenue

field has produced 740 million barrels of oil. The Oxnard oil field is the most productive on the Simi-Oxnard trend, having produced 31.8 million barrels.

(k) Production in the Rincon trend has been primarily from the Pico and Repetto formations, and in the Oakridge-Montalvo, from the Pico and Sespe formations. The Pliocene formations in the Oakridge-Montalvo have not been as productive as on the Rincon trend, because of the Repetto formation is thinner on the Oakridge-Montalvo than on the Rincon.

(l) In the area of the Ventura Basin lying east of the City of Santa Barbara, the majority of production has been from the Pico and Repetto formations of the Pliocene age, with some from the Miocene. In the area west of the City, production is from the Vaqueros and Sespe formations of the Oligocene age.

(m) The offshore Dos Cuadras oil field on the Rincon trend is the one on which the Union oil well blowout and oil spill occurred, hereinafter mentioned. Such field is about 6 miles south-southeast of the central part of the coast of Santa Barbara, California.

It is adjacent to the Federal Econological Preserve, and only about a mile from from the Santa Barbara Oil Sanctuary. It is about 7 miles north-northwest of the northernmost boundardy of subject tracts.

(n) The lease (OCS-P-0241) of the tract (402) on which the Union oil well blowout occurred was acquired from defendant by Union Oil, Gulf Oil, Texaco and Mobil at the general channel lease sale of February 6, 1968.

30. (a) In 1965, Dr. Ogle made a study of the West Montalvo oil field, considering possible development of the field to the south, and found that in the northern part, the major oil production was from the Sespe formation, with oil also produced from the Repetto, and gas from the Middle Pico, and that in the southern part, there was oil production from the Sespe.

(b) The Sespe was generally 4,000 feet thick in this area, and the producing zones were generally from 1,000 feet below the top of the Sespe to its base. Oil production from the Sespe was from separate fault blocks,

formed by the updip fault being intersected by various cross faults, with displacement being from 50 to 100 feet, with each fault block being a "piece of pie" structure at a different interval of depth in the Sespe.

(c) Oil as trapped in such blocks, and production occurred from them, even though Sespe sands at higher levels were water wet, as much in some places as the upper 2,000 and 3,000 feet of the Sespe.

(d) This same structural trapping of oil in the Sespe below water wet sand occurred in the South Mountain oil field, east of West Montalvo on the Oakridge-Montalvo trend, and in the Oxnard field, southeast of West Montalvo.

31. As part of Pauley's preparation to bid, a miniature submarine was employed by geologists to make observations of the ocean floor in the area extending from the northwest side of Santa Cruz Island to Santa Rosa Island, and geologists worked as scuba divers there, to help project the geology of the islands out into the center of the channel.

32. (a) Following the formation of the Pauley-Colorado-Huber group, Pauley during 1967 endeavored to enlarge the number of participants in its Santa Barbara Channel venture, and contacted over 100 other oil companies. None made any commitment until defendant had published its notice of the lease sale on December 28, 1967. Shortly thereafter, a number of such companies undertook an intensive review of the data Pauley had developed on the channel.

(b) On January 23, 1968, Pauley, Colorado, Huber, Husky, Midwest, Kewanee and Ashland executed a letter of intent concerning submission of joint bids on channel tracts.

(c) On January 29, 1968, these same companies and McDermott and Forest entered into a joint bidding agreement, with Pauley designated as initial operator of any lease in which it acquired and interest. A proposed operating agreement was attached. For business reasons, McDermott desired to be unknown as a bidder, and it was agreed that McDermott's portion of any bid would be made in Pauley's name.

(d) By agreements made during February 2-5, 1968, Pauley assumed a portion of Forest's

obligations, and assigned some of its interest to Mesa and Macdonald under the bidding agreement.

(e) Prior to bidding, representatives of the companies in the bidding group met at Pauley's office in Los Angeles, and after hearing the proposals of each company, decided the channel tracts on which to bid, and the amounts of the bids. Pauley's president was chairman of the meeting. He was authorized to vary the agreed amount of each bid by approximately one percent.

(f) Bidding together or in various combinations, the originallessees (Pauley, Colorado, Huber, Husky, Midwest, Kewanee and Ashland) submitted bids on 11 tracts and exposed in excess of $150 million at the sale.

33. On their successful bids on tracts 375 and 384, the respective bonuses of $43,503,147 and $30,351,447 paid to defendant for subject leases were contributed by the various members of the Pauley group as follows:

Member	Tract 375[*] Percent	Amount	Tract 384 Percent	Amount
Pauley	8.841	$ 3,845,113	6.0	$ 1,821,087
Colorado	15.340	6,673,383	12.5	3,793,930
Mesa	2.500	1,087,579	2.5	758,786
McCulloch	-0-	-0-	2.5	758,786
Huber	12.500	5,437,893	12.5	3,793,930
Husky	12.273	5,339,141	10.0	3,035,145
Midwest	12.273	5,339,141	10.0	3,035,145
Kewanee	10.000	4,350,315	10.0	3,035,145
Ashland	12.273	5,339,141	10.0	3,035,145
Macdonald	4.000	1,740,126	4.0	1,214,058
Forest	-0-	-0-	10.0	3,035,145
McDermott (TransOcean)	10.000	4,350,315	10.0	3,035,145
	100.000	$43,503,147	100.0	$30,351,447

* The format of some tables has been altered to conform with the United States Supreme Court's Rules regarding page and type size. These changes do not affect the substance of the Trial Judge's findings.

34. These same members of the Pauley group reimbursed Pauley for its prebid expenditures on the Santa Barbara Channel venture to the extent of $1,490,474, as follows:

Colorado	$ 249,427
Mesa	40,620
McCulloch	20,000
Huber	249,427
Husky	140,000
Midwest	140,000
Kewanee	140,000
Ashland	140,000
Macdonald	56,000
Forest	175,000
McDermott (TransOcean	140,000
	$1,490,474

35. (a) On February 7, 1968, the members of the Pauley group on each of subject tracts executed an operating agreement. As to each of such tracts, Pauley was designated as operator, and an Operating Committee was established, composed of one representative to be named by each member to exercise supervision and control of all matters pertaining to exploration, development and operations, with each member's vote proportionate to its percentage interest in the tract. As to each tract, the members authorized the drilling, casing and testing of one test well, with the well to be drilled to a

reasonable depth, not required to be deeper than 10,000 feet, with any subsequent wells to be approved by the Operating Committee.

(b) On or about February 19, 1968, each member of the Pauley group duly filed with defendant's Geological Survey a statement designating Pauley as operator of subject leases.

36. (a) During the 11-month period, March 1, 1968 through January 31, 1969, the Pauley group expended $2,748,192 and $1,177,104 respectively on tracts 375 and 384 for drilling and other operations to find oil and gas.

(b) Such expenditures were ratably allocable to the member companies under their operating agreements in accordance with their respective interests in the leases.

(c) Of the total expenditures on tract 375, TransOcean paid $274,819, as did Kewanee, and of those on tract 384, TransOcean paid $117,710.

37. (a) A Hydrocarbon reservoir exists when certain essential geologic conditions

prevail in the subsurface. There must be a trapping mechanism composed of impermeable material, such as shale, overriding and enclosing to some depth porous and permeable material, such as sandstone, and there must be commercially producible oil or gas contained in the reservoir rock within the trap. Of course, a geologic trap may exist without hydrocarbon presence.

(b) There are three major types of traps, i.e., anticlinal, stratigraphic, and fault traps, which individually or in combination have been the geologic structures which have generally held pools or reservoirs of oil and gas.

(c) Anticlinal trap. An anticline is an upfold of rock layers which dip in opposite directions from the crest of the fold, or in all directions from an anticlinal dome. A syncline is shaped like an inverted anticline, and the downdip layers on one side of an anticline are updip layers of an adjacent syncline. An anticlinal trap is composed of an impermeable layer of rock overlying a porous and permeable layer in which hydrocarbons are held within the arch of the anticline, with

horizontal enclosure of the reservoir rock furnished by pinching out or fault blocking of that layer against impermeable material, or by continuity of the overriding layer in an anticlinal dome.

(d) A typical stratigraphic trap exists when a porous and permeable material updips and terminates in a surrounding body of impermeable rock, with horizontal enclosure furnished by pinching out or fault blocking of the reservoir rock. However, stratigraphic traps, holding oil, are commonly found, in which the sandstone reservoir rock is completely enclosed by shale which was formed from mud which enveloped separate areas of sand in the deposition of sediments.

(e) Fault trap. A fault is a break in the earth's crust, with major or minor movement fracturing the once-continuous rock layers along the plane of the fault, generally inclined from the vertical. When substantial displacement has occurred, the layers on one side of the fault have moved upward or downward in relation to the corresponding layers on the other side. After the displacement, a fault trap exists when a porous and

permeable layer, updipping on one side of the fault, is blocked by an impermeable layer on the other side, and when other conditions are present, such as the existence of trapping mechanisms in other directions.

(f) Reservoir rock must have effective porosity and permeability, to permit the holding and transmission to the well bore of economically producible amounts of hydrocarbons. Consolidated sandstone often has such characteristics, and geologists refer to it as "sand" or "sands." In Southern California, it is not uncommon for reservoir material to be unconsolidated sands. Dense materials may be interspersed through a hydrocarbon reservoir, if effective porosity and permeability exist.

38. (a) Ronald G. Heck, with a B.S. degree in geology in 1956, Brigham Young University, and one year of postgraduate study there, is a registered geologist of California, and a certified petroleum geologist of the American Association of Petroleum Geologists. From 1957 to 1961, he was employed by Sun Oil Company, doing wellsite geology and geologic mapping in the Ventura Basin and other areas of Southern California. From 1961 to late 1968, he

was employed by Pauley, and then joined Dr. Ogle's firm of consulting geologists.

(b) Most of Heck's work with Pauley was on the Santa Barbara Channel. He prepared geologic maps of Pauley's tract 9A of California channel lands, participated in the geologic evaluation on Pauley's unsuccessful bid on California channel tract 22A, and prepared all of the geologic maps for Pauley's unsuccessful bid on the first Federal channel tract leased. He was Pauley's project manager on its prebid exploration of the channel for the Federal general lease sale.

(c) In such exploration program, he prepared geologic maps showing the types, depths and structures of formations existing in various parts of the channel, and particularly in and near tracts 375 and 384. He used the migrated sections and seismic data of the channel surveying, interpretations of the well logs of the core holes, paleontologic analyses of cuttings and samples from the core holes, and Dr. Ogle's study and projections of onshore geologic conditions into the channel.

(d) Mr. Heck's maps indicated the existence of trapping mechanisms in various rock formations, which were known to be productive of oil and gas elsewhere in the Ventura Basin, and which presumably would be productive in the channel. These maps and supporting data were reviewed by the various companies in considering whether to enter into a bidding agreement with Pauley, and were used by Pauley and the others who did submit bids.

(e) The electric logs (sonic, neutron, induction and density) made available from the core hole drilling, like those later made by Pauley in its postbid exploratory wells, were recordings of measurements obtained by use of technical equipment in each core hole. Such recordings are used by well log analysts to measure porosity (pore volume for accumulation of fluid per unit of volume of each formation), hydrocarbon saturation (percentage of oil and gas of the fluid in a porous formation), permeability (measure of ease or difficulty of fluid movement through a formation), and resistivity (measure of extent of invasion of drilling fluid, called mud, into a formation).

(f) Interpretations of electric log data are used by a geologist to identify various formations, such as sandstone, siltstone, shale or limestone, and also to ascertain the dip of a formation from one well location to another.

(g) During drilling operations, a fluid, called mud, is pumped into the pipe composing the drill stem, from which the mud flows out of an aperture in the bit assembly, and returns in the bore hole outside the drill pipe to the surface and into a mud pit for further circulation. Before recirculation, gas or oil shows contained in the mud from a subsurface formation are removed. The mud column has a hydrostatic pressure greater than the subsurface formations encountered, to avoid a blowout of the well, whenever possible. A mud log is kept by the wellsite geologist. It is a compilation of data indicated at successive depths of drilling, such as variations in the rate of drilling (indicative of changes in types of formations), types and depths of rock as determined from cuttings carried in the mud stream, shows in the mud of oil or gas in a formation, and the taking of sidewall or core samples or cuttings for paleontologic or other analyses.

(h) A dipmeter is a four-armed tool inserted in the bore hole, which makes contact with the sidewall at four points, measures the resistivity of waters in the rock units, and furnishes data, recorded on a dipmeter log, from which calculations are made as to the dip, strike and direction of trend of formations.

(i) Paleontologic analysis is a determination of the geologic age of a rock sample by microscopic observations of the species of foraminifera therein. By classification of foraminifera as to age of deposit, paleontologists have established foraminiferal zones in successively deeper formations, and by microscopic examination, a rock sample can be identified as taken from a particular zone of a certain formation, e.g., zone 31 of the Middle Pico of the Pliocene age.

39. (a) With respect to his prebid mapping of subject tracts, Mr. Heck prepared two sets of geologic cross sections and contour maps, one set covering subject tract 384 and its adjacent tract 385 to the west, and the other set, subject tract 375 and its adjacent tract 376 to the west.

(b) As to tracts 384 and 385, he made three north-south cross sections, one each across 384 and 385, and the third across tract 386, closely parallel to and coextensive with the western boundary of tract 385. Each cross section was along the pertinent part of a north-south seis line which had been run by Pauley.

(c) Cross section of tract 384. This cross section extends north-south on seis line 32A across tract 384 near its western boundary, and also includes that seis line in the northern part of tract 375. Five core holes, each drilled on or near the pertinent part of the seis line, are drawn in accordance with their relative locations, being spaced along the cross section from north to south. The core hole in the center of the cross section has a total depth of 3,261 feet, the two to the north, respectively 5,560 and 5,773 feet, and the two to the south, 6,250 and 6,527 feet. The cross section, with an overall depth of 11,000 feet, shows anticlinal structure of the various formations, with the crest at the center, and the formations dipping north and south therefrom. The top lines of the Middle Pico, Lower Pico, Repetto and the estimated top

of the Miocene are shown. Mr. Heck drew such lines, primarily using the pertinent migrated section of the seis line, together with projection of onshore data, but with respect to depths reached in the core holes, also used the corresponding points shown on the electric logs and paleontologic reports of cuttings to determine the tops in each core hole and project them from well to well through the cross section. Two faults are shown, based primarily on the seismic data, the Oakridge fault thrust zone at the north end, and a lesser fault at the south end of the cross section. Each fault was penetrated by one of the core holes. Gas shows were indicated in the lower depths of the core hole at the center of the cross section. A large central block was drawn as an area of assumed accumulation of hydrocarbons.

(d) Cross sections of tract 385. Two cross sections relating to tract 385 were drawn, one along seis line 34A, extending north-south a short distance west of tract 384, and the other along north-south seis line 40A across tract 386, closely parallel to the western boundary of tract 385. Each of these cross sections showed one nearby core hole,

with respective depths of 5,032 and 5,719 feet. These cross sections, each with an overall depth of about 11,000 feet, also showed anticlinal structure of the subsurface formations, with the crest near the center, and the contour lines of the tops of four zones in the Middle Pico, and of the estimated tops of the Lower Pico, Repetto, and Miocene. The line 34A cross section showed the Oakridge fault thrust zone at its north end and also four minor faults, with three minor faults shown on the line 40A cross section. Displacement of formations along fault planes are shown. A large block in the center of the line 34A cross section, drawn in the Pico and Repetto formations, is indicated as the area of assumed accumulation of hydrocarbons.

(e) Contour maps of tracts 384 and 385. Using his pertinent cross sections, as well as the seismic and other data, Mr. Heck prepared four contour maps covering tracts 384 and 385 and the northern part of tract 375. Each map portrays by contour lines the anticlinal top of one of the four successively deeper formations, there being one map for each of the Middle Pico, Lower Pico, Repetto and Miocene formations. Each formation is in

general shown as a domelike anticline, elongated east-west through tracts 384 and 385. From north to south, the structure lies between the Oakridge fault thrust zone, extending east-west through the northern parts of tracts 384 and 385, and the east-west synclinal axis, extending through the northern parts of tract 375 and 376. The crest of the structure is located in the western half of tract 384 and the eastern half of 385, with the dip of each formation in all directions from the crest. The successively deeper contour lines of each formation around the overall structure are generally displaced at fault lines, which are shown to exist across or along the structure. At 100-foot intervals, the contour lines on the Middle Pico map are from depths of 3,600 to 5,000 feet; on the Lower Pico, 4,900 to 6,000 feet; on the Repetto, 6,200 to 7,500 feet; and on the Miocene, 7,900 to 8,600 feet. On the maps of the upper three of the formations, Mr. Heck showed a large area in the crest of each formation as assumed accumulation of hydrocarbons.

(f) In the same manner as on tracts 384 and 385, Mr. Heck prepared four north-south cross sections with respect to subject tract 375 and its adjacent tract 376 to the west,

three on 375 and one on 376, each along the pertinent part of a north-south seis line which had been run by Pauley.

(g) Cross section of tract 375 along seis line 28. This seis line extends north-south a short distance west of the east boundary of the tract. This cross section, with an overall depth of 6,500 feet, shows anticlinal structure of the various formations, with the crest in the southern half, and formations dipping moderately to the north and sharply to the south of the crest. Two major faults are shown, one at the center and the other at the north end of the cross section, and in between those two, two minor faults, with displacement of the formations shown along the fault planes. The tops of four zones of the Middle Pico, and the tops of the Lower Pico, Repetto and Miocene are portrayed. One core hole is drawn, having a depth of 2,100 feet, located in the northern half of the cross section.

(h) Cross section of tract 375 along seis line 30. This seis line extends north-south a short distance east of the center of the tract. The cross section, with an overall depth of 7,000 feet, shows anticlinal

structure like the cross section of this tract along seisline 28. The same central major fault, and one minor fault in the northern half, are shown, with displacement along the fault planes. The tops of four zones of the Middle Pico, and the tops of the Lower Pico, Repetto and Miocene are portrayed. One core hole is located between the two faults, having a depth of 4,900 feet, with oil shows below 4,800 feet, with a blowout of the well indicated at total depth. A contour line just below the top of the Repetto, updipping from the minor to the major fault, and crossing the location of the blowout of the core hole, is indicated as the top of an oil zone in the Repetto.

(i) Cross section of tract 375 along seis line 30A. This seis line extends north-south a short distance west of the center of the tract. The cross section, with an overall depth of 6,900 feet, shows anticlinal structure similar to cross sections of this tract along seis lines 28 and 30, except that the crest is at the center. The central major fault is slightly off the crest on the north dip or flank of the anticline, and a minor fault is shown in the northern half. Displacements along the faults are shown. The tops of four

zones of the Middle Pico, the tops of the Lower Pico and Repetto, and the assumed top of the Miocene are drawn. The Repetto is shown to exist north of the major fault, and to a slight extent on the crest, but not on the south dip or flank of the anticline. Between the two faults, a contour line updipping from the minor to the major fault, is designated as the top of an oil zone in the Repetto. One core hole is shown on this cross section, having a total depth of 3,402 feet, located toward the southern end of the cross section. Oil and gas shows occurred below 3,000 feet, and in that zone of the Middle Pico, oil sands are indicated on the cross section as existing in the dip of the formation from the central fault to the south end of the cross section.

(j) Cross section of tract 376 along seis line 34. This seis line extends north-south on tract 376 a short distance west of the west boundary of tract 375. The cross section, with an overall depth of 7,000 feet, also shows anticlinal structure like the three cross sections of tract 375. A minor central fault and a major fault at the north end show displacement of the formations. The tops of four zones of the Middle Pico, the tops of the

Lower Pico and Repetto, and the assumed top of the Miocene are drawn. One core hole, with total depth of 6,527 feet, is shown, drilled through the major fault at the north end.

(k) Contour maps of tracts 375 and 376. Using his pertinent cross sections, as well as seismic and other data, Mr. Heck prepared six contour maps covering tracts 375 and 376. They show an anticlinal structure of the successively deeper formations, complicated by faulting. As drawn, the structure terminates at its east end at a major north-south cross fault located at and near the eastern boundary of tract 375. From the major cross fault, the structure extends eastwest through the central and southern parts of tract 375, and into the central area of tract 376. The crestal area of the structure is in the eastern half of tract 375, adjacent to the major cross fault. The successively deeper contour lines on each map (drawn at 100-foot intervals of depth terminate at the major cross fault, but otherwise show dips of the formations rather sharply to the north and south, and gradually to the west, thus forming an elongated, but truncated, anticlinal dome. There is one contour map

for each of the tops of four zones of the Middle Pico. For the first zone, the contour lines are from 1,400 to 2,000 feet in depth; for the second, from 1,700 to 4,000 feet; for the third, from 2,000 to 4,500 feet; and for the fourth, from 2,600 to 5,000 feet. On the Lower Pico map, the contour lines drop from flank of the overall structure, the contour lines drop from 3,600 to 6,000 feet. On the Repetto map, showing only the north flank of the overall structure, the contour lines drop from 4,600 to 6,000 feet. Each map indicates its formation as drawn to be an assumed area of accumulation of hydrocarbons, except some fringe areas of contour lines.

(1) Mr. Heck's cross section and contour maps, relating to both tract 375 and 384, showed an anticlinal structure (the south structure) extending through the central and southern parts of tract 375, and another anticlinal structure (the north structure) through tract 384 and the northern part of tract 375, with a syncline extending between the north and south structures.

40. (a) Mr. Robert E. Rakestraw, B. E. (1952) and M.S. (1962) in petroleum engineering,

University of Southern California, a registered professional petroleum engineer of California, prepared Pauley's prebid engineering evaluations of tracts 375 and 384, as well as others, in consultation with other personnel, and in reliance on Mr. Heck's geologic maps, with their assumed accumulations of oil and gas.

(b) Mr. Rakestraw had had considerable experience for 12 years as an evaluation, production and reservoir engineer employed by Richfield Oil Corporation, now Atlantic Richfield Company, in oil fields in Southern California. He thereafter served as a consultant on such matters for the state of California for one year and for the Government of Algeria for several months. In 1967 and 1968, he was employed by Pauley as Manager of Economics and Evaluations, and from 1969 to the present, as Manager of Production and Engineering.

(c) The prebid evaluations of tracts 375 and 384 related only to primary recovery of oil and gas therefrom, i.e., that which would result from the natural energy of gas expansion within a reservoir. Secondary recovery is accomplished by injection of energy which, in conjunction with remaining natural energy, acts

to accomplish recovery of additional oil and gas which would remain in a reservoir, not otherwise producible after major reduction of the natural energy. Secondary recovery may be undertaken while primary production is in progress. The commonly used method of secondary recovery is injection of water, called waterflooding, into the reservoir. Secondary recovery by such method was included by Mr. Rakestraw in his postbid evaluations of tracts 375 and 384, as hereinafter related.

(d) As to the existence, locations, depths, thicknesses, lithology, geologic formations, and areal extents of oil and gas reservoirs underlying tracts 375 and 384, Mr. Rakestraw relied upon the geologic maps and other data furnished by Pauley's geologists. From this data, he computed the volumes of reservoir rock.

(e) After the calculation of reservoir volumes, the successive steps in the engineering evaluation of an oil and gas field are: (1) estimation of the volume of oil and gas underlying the property and the amounts thereof that can be produced; (2) projection of the rate of production of such oil and gas over a

period of years; (3) conversion of that production into gross income based on existing market values of oil and gas; (4) determination of net income by subtraction of direct and indirect costs to explore, develop and produce such oil and gas; (5) calculation of the present worth of the net income; and (6) application of a probability of success (risk factor) to the present worth.

(f) To accomplish the first two steps, Mr. Rakestraw undertook by analogy to other fields to ascertain the reservoir characteristics of subject tracts. He obtained, reviewed and analyzed production curves, reservoir statistics, published reports and correlation charts, relating to producting oil fields in the Ventura Basin, such as the Ventura Avenue, San Miguelito, and the South Mountain, producing from geologic formations which he was advised were like those in the assumed reservoirs in subject tracts.

(g) From this data, Mr. Rakestraw prepared his own correlation charts, relating one reservoir parameter as against another, i.e., stock tank oil in place (being the volume after allowance for shrinkage resulting

from liberation of gas from oil in place upon being brought to the surface) versus depth of a producing horizon; porosity versus depth; water saturation versus depth; formation valume factor (being the ratio of reservoir oil to stock tank oil) versus depth; permeability versus water saturation; permeability versus depth; formation temperature versus depth; oil viscosity versus depth; oil gravity versus depth; initial solution GOR (gas:oil ratio) versus depth; and unadjusted oil mobility versus depth. With respect to primary recovery, his charts correlated primary oil recovery versus depth; and primary percent oil recovery versus depth; and as to secondary recovery, percent oil recovery versus depth; and percent oil recovery versus mobility ratio. He also prepared correlation charts as to the initial oil rate versus net sand; and oil rate factor versus depth.

(h) Using the pertinent parameters or reservoir characteristics thus established by analogy to those of producing fields in the Ventura Basin, and applying them to standard petroleum engineering equations, Mr. Rakestraw calculated as to the volume of reservoir rock of each of subject tracts: (1) the number of

barrels of stock tank oil in place per acre foot; (2) the recoverable oil (bbls.) per acre foot of reservoir rock; (3) the recoverable oil from the total reservoir volume; and (4) the recoverable gas from the total reservoir volume.

(i) Using his correlation charts, Mr. Rakestraw determined with respect to each reservoir the initial rates of recovery of oil and gas, the rates of decline in production, and the period of years required until primary production was complete.

(j) Mr. Rakestraw then calculated the gross income from the recoverable oil and gas, based on existing market values, and deducted therefrom the estimated cost to explore, develop and produce such oil and gas, to arrive at the net income to be expected.

(k) The pertinent values resulting from Mr. Rakestraw's prebid evaluations of tracts 375 and 384 were as follows:

	Tract 375	Tract 384
Net oil -- bbls.	303,010,000	193,892,000
Net gas -- MCF	298,686,000	372,527,000
Gross income	$903,258,538	$650,905,036
Total capital cost	$ 99,486,200	$ 62,251,255
Total operating cost	$121,285,260	$102,309,375
Net income	$682,487,078	$486,344,406

These figures for tract 384 were what Mr. Rakestraw considered to be the "most likely case" for that tract. He arrived at lesser figures for a "minimum case" and at greater figures for a "maximum case" for the same tract, with the latter alone including secondary recovery, excluded from his prebid evaluations.

(l) The anticipated net income was discounted at 6 percent per annum to calculate present worth of $451,769,644 for tract 375 and $295,194,505 for tract 384, computed in relation to rates of production over the period of years until completion of operations.

(m) In his prebid evaluation of tract 375, Mr. Rakestraw calculated that production would require four platforms and 275 wells, with optimum spacing of one well for 10 acres of oil field area; and as to tract 384, two platforms for 185 wells, spaced one well for 15 acres.

(n) Pauley's president, Mr. William R. Pagen, made the final decision, after considering the advice of Pauley's geologists and petroleum engineers, and after conferring with its board of directors, as to what

amounts Pauley would bid on tracts 375 and 384. To the present worth of $451,769,644 on tract 375, he applied a "risk factor" of about 48 percent to arrive at about $220,000,000; to which latter figure, he applied a factor of 75 percent to reach a "present value" of $165,000,000; to which latter figure he applied a "bid factor" of 25 percent to reach a bid value of about $41,250,000. In the same manner, he reduced the present worth of $295,194,500 on tract 384 to reach a bid value of about $27,000,000. As previously stated, the actual bids by Pauley and the other original lessees were respectively $43,503,147 and $30,351,447 on tracts 375 and 384, after the bidding conference held by such parties.

41. (a) Following the execution of the subject leases effective March 1, 1968, Pauley, as operator, with the successive approvals of the Operating Committee of the lessees, drilled seven exploratory wells, number 1 through 7, plus a redrill of No. 2, on tract 375, and one exploratory well (No. 1) on tract 384. As operator, Pauley prepared and submitted to the Operating Committee a detailed program as to each well, specifying location, water depth, total well depth, and the procedures and

requirements to accomplish that part of the exploratory program. Such program was designed to meet Geological Survey requirements, and included detailed cost estimates. When approved by the Operating Committee, the program was used by Pauley to prepare the application for permit to drill, and also as a basis for the cash call made by Pauley on the interested members to advance their shares of the estimated drilling expenses.

(b) With respect to each of the eight wells (and the redrill), and before commencing drilling operations, Pauley submitted to the Los Angeles District Engineer, Geological Survey, an application for permit to drill, which was promptly approved. Pauley provided to the same officer weekly reports of drilling operations on each well, and when such well was completed, its proposed program for plugging and abandonment of the well, which was also promptly approved, and then accomplished by Pauley. As to each well, Pauley furnished the Geological Survey with its report of abandonment of the well, providing a history of the well, copies of the well logs, log analyses, descriptions of core and sidewall samples, paleontologic reports, and other required data.

Except for a simple clerical error in the first application for permit to drill, no exceptions or complaints were communicated by the Geological Survey to Pauley concerning its drilling or abandonment programs or other filings with respect to any of the wells drilled on subject tracts. No complaint was made by any of the Geological Survey employees who from time to time observed Pauley's drilling operations, and the Los Angeles District Engineer knew of no instance of violation of any regulation or order of the Geological Survey concerning drilling requirements.

(c) Using a drilling vessel (Wodeco I) and crew of Western Offshore Drilling and Exploration Co., Pauley drilled consecutively wells Nos. 1 through 5 (including in order the redrill of No. 2) on tract 375 in the period from March 24, 1968, to September 14, 1968.

(d) The Wodeco I was then released temporarily, with the approval of the Operating Committee, for use by Phillips Petroleum in the redrill of a well on a California channel tract in which Pauley had a 50 percent interest, and then for use by Continental Oil Company in drilling one exploratory well on a channel

tract. Before further drilling on tract 375, the lessees needed time to review the well data which had been accumulated on the five wells drilled.

(e) From August 15, 1968, to October 15, 1968, Pauley drilled Well No. 1 on tract 384, using another drilling vessel (Wodeco VI). Thus, during the month prior to the release of Wodeco I, Pauley was drilling with two vessels, one on each tract.

(f) On November 7, 1968, the Operating Committee considered Pauley's proposal for drilling of a second exploratory well on tract 384, but postponed making a decision until January 1969 to give preference to further drilling on tract 375.

(g) Wodeco I was returned to Pauley, and from November 27, 1968, to January 24, 1969, 4 days before the Union oil well blowout, Pauley drilled consecutively wells Nos. 6 and 7 on tract 375.

(h) The exploratory wells drilled, with their respective water depths and total depths, were as follows:

Well No. (tract)	Water depth in feet	Total depth in feet
1 (375)	481	11,661
2 (375)	386	6,306
2 redrill (375	-	7,588
3 (375)	590	6,718
4 (375)	562	7,115
5 (375)	576	5,004
6 (375)	505	10,654
7 (375)	364	6,968
1 (384)	321	13,122

(i) During the month when both Wodeco I and Wodeco VI were being used, Pauley's drilling costs were about $25,000 per day. Drilling costs on tract 375 ranged from $8,278 to $13,838 per day, and on tract 384, averaged $16,919 per day.

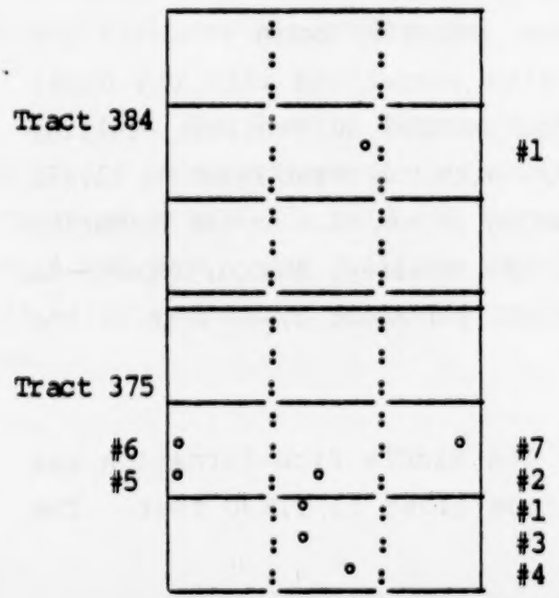
(j) On January 23, 1969, the Operating Committee met and approved Pauley's proposed program for drilling of Well No. 2 on tract 384, and Pauley issued a call to the member companies for contribution of their respective shares of the estimated cost of $438,000 for the drilling operations planned for the immediate future. Pauley had also prepared a proposal

for drilling of Well No. 8 on tract 375, which had been opposed by some plaintiffs, and the Operating Committee was unable to agree on any of the discussed locations, and deferred consideration of further drilling on that tract for an engineering study of remaining potential reserve areas. Neither of these proposed wells was drilled.

(k) Upon completion of Well No. 7 on tract 375 on January 24, 1969, Pauley released Wodeco I to its owner, for use by Mobil Oil Corporation, and expressed its intent to the owner that such vessel would be returned to Pauley for further drilling on tract 375. Wodeco I did not have the capacity for the deep drilling contemplated on planned Well No. 2 on tract 384, and for those operations, Pauley was negotiating for use of Wodeco II. Wodeco VI, the only other available vessel with sufficient capacity, was then being used by Texaco. Commencing February 1, 1969, Wodeco II was used for drilling a relief well on the Union oil well blowout, and had overseas commitments soon thereafter. Between January 29, 1969, and February 12, 1969, the owner of Wodeco VI and Pauley negotiated the terms of a contract for use by Pauley of that vessel.

However, Secretary of the Interior Hickel had imposed suspension of drilling following the Union well blowout on January 28, 1969, and Pauley's application, filed February 11, 1969, for a permit to drill Well No. 2 on tract 384 had not been granted, and Pauley therefore did not execute the contract for Wodeco VI, although the owner of the vessel had.

42. The following sketch shows tracts 384 and 375 in their relative positions from north to south. The dotted lines divide each tract into areas one mile square. The postbid exploratory wells drilled by the Pauley group, Nos. 1 through 7 on tract 375, and No. 1 on tract 384, are located approximately as follows:



The approved site of planned Well No. 2 on tract 384 was about 1/3 mile north of the south boundary, in the south central part, about a mile southwest of Well No. 1 on that tract. The proposed site of Well No. 8 on tract 375 was about 2/3 mile north of Well No. 6, just inside the west boundary of that tract.

(43) (a) Well No. 1 on tract 375 was drilled in the south central part of that tract at a point slightly south of the anticlinal crest of the Pico horizons on the south structure. It was purposely located updip on the structure from a prebid core hole which had some shows of oil and gas, and near another prebid core hole. It was somewhat less than a mile north of the south boundary of tract 375. Originally programmed for a depth of 7,000 feet, the intention being to drill the Pico and Repetto formations into the Upper Miocene, it was decided to continue drilling from that depth, with the total reaching 11,661 feet, encountering in addition to the formations first planned, the Monterey, Rincon, Topanga-San Onofre, Vaqueros, and about 1,300 feet of the Sespe.

(b) The Middle Pico formation was encountered from 1,065 to 3,830 feet. The

sands were thin, not deposited as thick homogeneous units. There were minor oil shows from 1,350 to 2,450 feet and from 3,750 to 3,865 feet. Only about 10 feet of possible net oil sand was present. For this overall interval, Mr. Heck in his postbid mapping did not include any Middle Pico sands as available for production, but considered the oil shows, although not substantial, as confirming his conclusion that a Middle Pico reservoir existed downdip south from such location. The dipmeter recordings indicated that this formation dipped rather sharply to the south.

(c) The Lower Pico formation was encountered from 3,830 to 4,371 feet. Dipmeter recordings indicated south dip of this formation. The well logs did not establish a sand sequence indicative of possible production.

(d) The Repetto formation (the Upper Repetto not being present at this location) was encountered from 4,371 to 4,648 feet. At and near 4,500 feet, the drilling intersected a fault slightly inclined southerly proceeding to depth.

(e) The Upper Miocene was encountered from 4,648 to 6,368 feet. Such formation is usually predominantly shale. However the aggregate sand count was 815 feet in the interval from 4,790 to 6,350 feet. The downdip of the formation was sharply to the northeast, indicating that the well course had crossed from the south to the north flank of the south structure as the well was deepened into the Miocene. From 4,690 to 5,000 feet, the mud log showed good traces of oil, and at about 4,700 feet, an oil show, but not much in the way of free gas.

(f) From 6,368 to 9,260 feet, a thick section of the Monterey formation was encountered, and then commencing at 9,080 feet, a relatively thin section of the Rincon. The closest wells previously drilled through the Monterey were located in the Oxnard coastal area, where the thicknesses encountered were substantially less than at this location. The mud log describes this overall interval as predominantly shale with limestone streaks, occasional cherts and rare sand streaks. Even with such relatively impermeable materials, the interval from 6,433 to 7,645 feet had a porosity of 18.6 percent,

and from 7,646 to 8,870 feet, 11.8 percent, indicating that there was fracturing of the Monterey formation. Dipmeter readings showed a substantial downdip of this formation to the northeast. The mud log indicated presence of hydrocarbons from 6,300 to 6,400 feet and 6,600 to 6,750 feet. While drilling was in progress, it was determined that the Monterey was not adequately oil saturated to be productive at this location.

(g) The Topanga-San Onofre formation was encountered from 9,260 to 9,780 feet. This interval was predominantly shale with a low percentage of sand. The porosity and permeability were too low for productivity. The dip of the formation changed from northeast to west at 9,540 feet, where a fault intersects.

(h) The Vaqueros formation was encountered from 9,780 to 10,330 feet. It is a sequence of shales and sands. The sand count was 27 percent of the interval. The porosity and permeability were low. There were only a few minor indications of presence of hydrocarbons. Dipmeter readings show substantial downdip of the formation to the northwest, west and southwest.

(i) The Sespe formation was encountered from 10,330 to 11,661 feet, without complete penetration, the estimated thickness being between 3,500 and 4,000 feet in the area of tracts 375 and 384. From 10,330 to 10,950 feet, the net sand count was 180 feet, with overall low permeability, with only minor indications of hydrocarbons, none significant. From 10,950 to 11,661 feet, the net sand count was 250 feet, with the permeability extremely low.

(j) Upon reaching total depth in this well, Pauley caused the equipment to be pulled from the hole, cemented the well, and abandoned that location.

44. (a) Well No. 2 on tract 375 was drilled at a point somewhat more than 1/2 mile northeast of Well No. 1, and was located high on the north flank of the south structure. It was purposely drilled near a California prebid core hole, having a depth of 5,005 feet, and also near the corresponding Federal "twin" core hole, having a depth of 4,838 feet. Pauley had the well data on both of these core holes. In the last 100 feet of depth of the California hole, good shows of oil and gas were encountered, and the state stopped the drilling and caused

the hole to be sealed. Pauley's purpose was to drill deeper at that location, and Well No. 2 had a total depth of 6,306 feet, encountering the Middle Pico, Lower Pico, Upper Repetto, Repetto, and Upper Miocene formations.

(b) The Middle Pico formation was encountered from 840 to 3,620 feet. There was very little sand above 2,590 feet. From 2,590 to 3,480 feet, there was a net sand count of 167 feet, with substantial porosity and permeability for the counted sands. There were no indications of hydrocarbon presence in most of such sands. Dipmeter readings show substantial downdip of the formation to the north and slightly west of north.

(c) The Lower Pico formation was encountered from 3,620 to 4,390 feet. From 3,480 to 4,440 feet, there was a net sand count of 261 feet, with substantial porosity and permeability for the counted sands. There were few indications of hydrocarbon presence. Dipmeter recordings indicated substantial downdip of the formation to the north.

(d) The Upper Repetto formation was encountered from 4,390 to 5,250 feet, and the

Repetto from 5,250 to 6,026 feet. From 4,440 to 4,910 feet, there was a net sand count of 110 feet, and from 4,910 to 5,320 feet, a net sand count of 55 feet. Porosity and permeability were substantialfor the counted sands. Both formations had substantial downdip to the north. Both had a fairly high volume of shale, and not any very large well-developed sand layers. Four core samples were cut at certain intervals of depth, with descriptions recorded and summarized as follows:

(1) Interval from 4,800 to 4,817.5: This 17.5-foot core had three thin layers of sand, respectively 1/2, 1/2, and 1 1/2 feet thick, interspersed between four layers of claystone and one layer of siltstone. The sands were described as fine-grained, silty, friable and porous. One sand layer was said to be well saturated with oil, and all had the odor and fluorescence of oil presence. Two layers of claystone were fractured, with dark brown oil covering the surfaces of the fractures, which oil was estimated to have a gravity of 15-18 degrees API.

(2) Interval from 4,820 to 4,835: This 15-foot core was claystone, fairly hard, very silty, grading in places to shaley siltstone, with the entire core containing widely separated thin interbeds of soft shale and a few 1/2 inch beds of fine-grained, friable, oil-saturated sand.

(3) Interval from 4,880 to 4,902 feet: Only a three-foot core was recovered, which was hard claystone.

(4) Interval from 4,902 to 4,921 feet: This * * * core had three layers of claystone, with the intermediate one being soft in contrast to the hardness of the other two layers.

There were rather good shows of oil interspersed through the interval from 4,765 to 4,860 feet, and good shows in the interval from which the above-described cores were taken.

(e) The drilling of Well No. 2 was shut down temporarily at a depth of 4,885 feet, because of the presence of a considerable

amount of gas in the mud stream. The drilling mud weight was increased as a precaution against blowout of the well. When the mud circulation resumed, a slug of oil came to the surface in the mud stream in such a manner that about two gallons were collected in a bucket. It is unusual to be able to collect an oil sample in that volume from the mud system. This oil remained standing in the open bucket for a couple of days, during which time the mud settled, and gas probably escaped. This sample was then sent to a testing service, and it was found that such oil had a gravity of 17.7 degrees API, at the time of analysis.

(f) When the drilling had reached a depth somewhat below 5,000 feet, an open hole drillstem production test was attempted. It failed because the well bore was enlarged to the extent that requisite packers could not be securely placed between the bore walls and the tester string of pipe, to accomplish sealing of the well in the area being tested. No attempt was made to employ the common practice of installing casing to conduct the production test. The cost of the attempted test was approximately $150,000. The decision was then made to drill deeper into the Upper Miocene formation.

(g) Good oil shows occurred in the interval from 5,125 to 5,260 feet, and in the last 10 feet of that interval, the well "kicked," meaning that gas escaping from the formation exerted greater pressure than the hydrostatic pressure of the mud column, indicating that there was considerable permeability in the formation at that depth.

(h) The uppermost part of the Upper Miocene formation was drilled from 6,026 to 6,306 feet, the total depth of the well.

(i) Well No. 2 redrill was accomplished by plugging the original hole back to a depth of 2,527 feet, and then slant drilling from that point in a northeasterly direction, penetrating the balance of the Middle Pico, through the Lower Pico, and reaching its total depth of 7,588 feet in the Upper Repetto. The redrill bottomed 2,756 feet distant from the original hole. Dipmeter readings confirmed substantial downdip to the north on the north flank of the south structure. The Middle Pico was encountered down to 3,790 feet; the Lower Pico, from 3,790 to 5,380 feet; and the Upper Repetto, from 5,380 to 7,588 feet. The electric logs were not reliable for counting of sands,

because of technical problems involved in slant drilling. The mud log indicated that thicker sands existed in the downdip of the formations from the original Well No. 2 location, particularly in the Upper Repetto. A fault was encountered in the redrill at about 5,750 feet. In the redrill, there were no hydrocarbon shows of any significance, but only minor ones.

45. (a) Well No. 3 on tract 375 was drilled at a point about 1/3 mile southwest of Well No. 1, and was located on the south flank of the south structure. It was purposely located near a prebid core hole, which penetrated the Middle Pico sands and had a hydrocarbon show at or near its total depth of 3,402 feet. Well No. 3 was drilled to determine the significance of that show, and to explore the Middle Pico and underlying formations. It penetrated the Middle Pico, and because the Lower Pico and the Upper Repetto did not exist at that location, then encountered the Lower Repetto, the Upper Miocene, and terminated in the Monterey at a total depth of 6,718 feet. Wells No. 3, 1 and 2 in that order were located from southwest to northeast in the central part of the south half of tract 375.

(b) The Middle Pico was encountered in Well No. 3 from 1,290 to 4,220 feet. From 2,080 to 2,590 feet, the net sand count was 257 feet; from 2,590 to 2,930 feet, the formation was predominantly shale; from 2,930 to 3,700 feet, the net sand count was 144 feet; and from 3,700 to 4,200 feet, the net sand count was 71 feet. Dipmeter readings indicated substantial downdip of this formation to the south. There were good oil and gas shows from 3,030 to 3,135 feet, from 3,155 to 3,210 feet, and from 3,325 to 3,350 feet. Three of several cores taken from this formation were cut from the following intervals, and were described as follows:

(1) Interval from 3,040 to 3,065 feet: This was a 9-foot 2-inch core which had successively alternate layers of claystone and oil sand, there being four of claystone and three of oil sand. The claystone layers varied in thickness from 2 inches to 3 feet 8 inches. The oil sand layers were from 8 inches to 1 foot 5 inches in thickness. The claystone was described as grey-green with brown streaks, and with oil on fractures. The oil sand was unconsolidated, fine to very fine grain, brown to very dark brown, saturated, with strong petroleum odor.

(2) Interval from 3,065 to 3,090 feet: This 19-foot core had a 6-inch layer of claystone at the top, and otherwise an 18-foot 6-inch layer of oil sand, very dark brown to black, fine to very fine grain, saturated, with strong petroleum odor.

(3) Interval from 3,090 to 3,115 feet: This 16-foot core was all oil sand, very dark brown to black, fine to very fine grain, saturated, with strong petroleum odor.

The analyses of the testing service showed substantial percentages of porosity and oil saturation in such cores, and the gravity of the oil was determined to be 14.8 degrees A.P.I.

(c) The Lower Repetto was encountered from 4,220 to 5,110 feet. It was a sand, silt and clay sequence. From 4,220 to 4,950 feet, there was a net sand count of 209 feet, with substantial porosity and permeability in the counted sands. Of the 209 feet, 49 feet were considered net oil sand, having a water saturation of less than 50 percent. Dipmeter readings

were scattered and inconsistent as to dip of the formation. At this location, the Lower Repetto and the underlying Upper Miocene and Monterey are shown on geologic north-south cross-section maps as being flat horizontal formations, being a structural terrace between two substantial faults. The mud log indicated presence of hydrocarbons starting from 4,200 feet, more pronounced in the interval from 4,610 to 4,825 feet, and from 4,950 to 5,110 feet.

(d) The Upper Miocene was encountered from 5,110 to 6,550 feet. From 4,950 to 6,550 feet, there was a net sand count of 657 feet, of which 467 feet were net oil sands, having a water saturation of less than 50 percent. Porosity and permeability were good in most of the counted sands. Dipmeter readings from 5,110 to 6,000 feet showed varying directions and inclinations, and from 6,000 to 6,550 feet, sharp dips to the northeast. The quality of the hydrocarbon shows on the mud log indicated that the interval from 4,950 to 6,160 feet was an oil bearing zone, and below that depth to 6,550 feet, there was some evidence of oil and gas accumulation, but in the latter interval, permeability was low.

(e) The uppermost part of the Monterey formation was encountered from 6,550 feet to 6,718 feet. In this interval, the mud log recorded shale, limestone and chert, and indicated presence of hydrocarbons, which suggested fracturing of the dense materials in this formation. Dipmeter readings showed generally substantial downdip to the northeast, with some to the northwest.

46. (a) Well No. 4 was drilled to total depth of 7,115 feet on the south flank of the south structure in the south central part of tract 375, about 2/3 mile east of Well No. 3, but somewhat farther south. From the location of Well No. 2 on the north flank of the south structure, Well No. 4 was almost directly south, but slightly more to the east. Well No. 4 encountered the same formations as Well No. 3 at comparable depths, and as in the latter well, the Lower Pico and the Upper Repetto were missing.

(b) The Middle Pico formation was encountered from 1,230 to 4,410 feet. From 2,225 to 2,610 feet, the net sand count was 193 feet; from 2,990 to 3,200 feet, 48 feet; from 3,200 to 3,400 feet, 57 feet; and from

3,400 to 4,400 feet, 134 feet. This formation had a substantial downdip to the south to a depth of about 3,500 feet, with the dip angle gradually decreasing and turning to the southeast, and with a low angle of downdip to the southeast and east in the interval from 4,000 to 4,400 feet. The mud log recorded presence of hydrocarbons from 3,100 to 3,750 feet, but not very much. From 3,750 to 3,980 feet, there were good oil shows, and significant hydrocarbon presence was indicated from 4,290 to the total depth of the Middle Pico at 4,410 feet.

(c) The Lower Repetto was encountered from 4,410 to 4,620 feet. This was a sand, silt and clay sequence. The net sand count for the entire interval was 36 feet. Dipmeter readings showed low angle dip to the east and northeast from 4,410 to 4,550 feet, and sharp dips to the north and northeast from 4,550 to 4,620 feet. There were slight oil shows in this formation.

(d) The Upper Miocene was encountered from 4,610 to 6,360 feet. There was a continuous presence of hydrocarbons. The net sand count in this interval was 1,125 feet, of which 14 feet were net oil sand. Dipmeter readings

indicated mixed north and south dips generally at high angles of inclination with some low angle dips.

(e) The uppermost part of the Monterey formation was encountered from 6,360 to 7,115 feet, the total depth of the well. The rock layers were siliceous shale, finely laminated, and chert, limestone and siltstone. From 6,750 to 7,115 feet, good oil and gas shows were recorded, indicating that this generally hard and brittle formation was fractured, also suggested by the marked changes in rate of drilling, with erratic gas shows indicative of good permeability. Substantial changes in direction of dip were recorded. There was a steep northeasterly dip beginning at 6,360 feet, decreasing in angle to 6,600 feet, at which depth there was a slight dip to the east, changing to a rather substantial dip to the south in the interval from 6,600 to 6,700 feet.

47. (a) Well No. 5 was drilled to a total depth of 5,004 feet just inside the west boundary of tract 375. It was somewhat more than a mile north of the south boundary. Its cost was shared by the Pauley group and

Union Oil Company and Gulf Oil Corporation, lessees of tract 376 adjacent to the west. The companies involved selected the particular site to test the Middle Pico, with the advance understanding that the well would terminate at 5,000 feet. At total depth, the electric logs were run, and sidewall samples taken, and then the well was abandoned.

(b) Well No. 5 was directly west of the space interveniig between Well No. 1 and Well No. 2. Although only slightly farther south than the latter well, it was located on the south flank of the south structure, considerably downdip from the crest of the anticline.

(c) Well No. 5 penetrated most of the Middle Pico from 1,620 to 5,004 feet, but no formations below that. Dipmeter readings showed substantial downdip to the south until a depth of 4,000 feet was reached, after which the downdip decreased until the formation was practically horizontal at total depth of the well. The Middle Pico sands were thicker than those encountered in Well No. 3, but were not considered to be hydrocarbon bearing because Well No. 5 was low on the structure. From 4,000 to 5,000 feet, there were scattered

indications of the presence of hydrocarbons, but only about 15 feet of substantial shows in this interval.

(d) From 2,450 to 3,260 feet, the net sand count was 568 feet; from 3,325 to 3,580 feet 178, feet; from 3,610 to 3,845 feet, 116 feet; and from 4,400 to 5,004 feet, 47 feet. Porosity and permeability were substantial in the counted sands.

48. (a) Well No. 6, also drilled in cooperation with Union and Gulf, was located somewhat less than 1/3 mile directly north of Well No. 5, just inside the west boundary of tract 375. With respect to the equidistant point between the north and south boundaries of the tract, it was somewhat south. It was somewhat farther north than Well No. 2, the farthest north of any of the previously drilled postbid exploratory wells on that tract. It was drilled near to, but south of the crest of the south structure, and to a total depth of 10,650 feet. With the Upper Repetto absent, this well otherwise encountered in succession the Middle Pico, Lower Pico, Lower Repetto, Upper Miocene, Monterey, Rincon, Topanga-San Onofre, Vaqueros, and penetrated the Sespe to total depth of the well.

(b) The Middle Pico formation was encountered from 1,105 to 3,450 feet. As in Well No. 1, also drilled through this formation just south of the anticlinal crest of the south structure, the sands in the Middle Pico were thin as contrasted with the thicker beds encountered in this formation in Well No. 5, drilled low on the south flank. Dipmeter readings showed substantial downdip of this formation to the southwest from Well No. 6. There were indications of the presence of hydrocarbons, but not sufficient to establish an oil accumulation at that location. From the thinness of the sands and the presence of hydrocarbons, Mr. Heck concluded that there was geologic structure entrapping oil downdip on the south flank of the south structure.

(c) The Lower Pico formation was encountered from 3,450 to 3,690 feet. It was a siltstone, claystone and thin sand sequence. Dipmeter readings provided contradictory and scattered information as to the dip of this formation.

(d) The Lower Repetto formation was encountered from 3,690 to 4,730 feet. Dipmeter readings indicated scattered and diametrically

opposed dips. There were 20 sidewall samples taken at successive depths throughout this formation, of which 10 were firm claystone; six were fractured claystone; and four were oil sand, fine-grained, dark brown, friable, with strong petroleum odor. For this entire interval, there was a net sand count of 181 feet.

(e) The Upper Miocene formation was encountered from 4,730 to 5,150 feet. Dipmeter information was poor. This was primarily a sequence of siltstone and claystone. Of the 18 sidewall samples taken in this interval, all of them were claystone, but most of them were fractured, and a fair to strong odor of petroleum was noted as to most of the fractured samples. There was a net sand count of 25 feet for this entire formation. However, there were 92 feet in the interval, which had water saturation of less than 50 percent, but the well log analyst considered most of the 92 feet as being too shaley to be counted as net sand. There were indications of gas throughout this formation, some of which were strong shows. Because of the low water saturation of the 92 feet, and the general presence of gas, Mr. Heck increased the well log analyst's net sand count of 25 feet to 92 feet.

(f) The Monterey formation was encountered from 5,150 to 7,900 feet, and the Rincon from 7,900 to 8,025 feet. As was usual in the Monterey, the rocks encountered were primarily shale, with areas of siltstone and chert, and fracturing of such dense materials would be necessary for them to hold producible hydrocarbons. Because of good oil and gas shows encountered from 5,762 to 5,787 feet, four cores were extracted from that zone. They varied from 6 to 7.5 feet in length, and were described as hard shale, with horizontal and vertical fracturing, with abundant free oil in the fractures. The cores showed that the dips in the formation at that location were vertical. There was a series of sharp changes in the direction and angle of dips throughout the Monterey formation. The mud log indicated presence of considerable hydrocarbons from 5,150 to 6,620 feet. From the mud log and the electric log analyses, Mr. Heck concluded that there was an oil-water interface (point at which oil in pore space exceeds the water therein) at 6,350 feet. At and near 7,200 feet, the well intersected a fault steeply inclined from the vertical toward the south.

(g) The Topanga-San Onofre formation was encountered from 8,025 to 8,520 feet. Dipmeter readings showed substantial dip of this formation to the north. The net sand count for this interval was 132 feet. Minor hydrocarbon shows were recorded in the area of 8,200 feet.

(h) The Vaqueros formation was encountered from 8,520 to 8,950 feet. Dipmeter readings showed substantial dip of this formation to the north. The net sand count for this interval was 358 feet. Porosity and permeability were generally good. There was some evidence of hydrocarbon presence, but only in low porosity sections.

(i) The Sespe formation was penetrated from 8,950 to 10,650 feet, total depth of the well. Dipmeter readings to 9,350 feet showed substantial downdip to the north-northeast, and below that depth, there were high angle dips, scattered and directionally opposed. There were signs of hydrocarbon presence in the upper portion of this formation, but the interval was generally water saturated.

49. (a) Well No. 7 was located in the eastern part of tract 375, about 1/2 mile from the eastern boundary. It was about 2-1/2 miles

directly east of Well No. 6. Like the latter well, Well No. 7 was somewhat south of the equidistant point between the north and south boundaries of the tract. It was almost a mile farther east than ell No. 2, and somewhat farther north. It was drilled on the northeast flank of the south structure. It encountered the Middle Pico, Lower Pico, Upper Repetto and part of the Lower Repetto, with its total depth at 6,978 feet.

(b) The Middle Pico formation was encountered from 884 to 4,740 feet. Dipmeter readings showed substantial downdip slightly east of north in the interval from 2,600 to 4,740 feet. From 3,650 to 4,750 feet, the net sand count was 425 feet.

(c) The Lower Pico formation was encountered from 4,740 to 5,460 feet. Downdip was substantial to slightly east of north from 4,750 to 5,460 feet, the net sand count was 75 feet.

(d) The Upper Repetto was encountered from 5,460 to 6,460 feet, with substantial downdip to the north slightly east of north. The net sand count was 328 feet for the

entire interval. There were good gas shows from 5,635 to 5,740 feet, and from 6,200 to 6,380 feet, but commercial zones were not encountered, and water saturation was indicated.

(e) The Lower Repetto was penetrated from 6,460 to 6,978 feet, total depth of the well. There was substantial downdip to the north and slightly east of north. From 6,460 to 6,950 feet, the net sand count was 194 feet. From 6,830 to 6,968 feet, gas shows were recorded, with some oil noted, and it was necessary in that interval to increase the mud weight to control the well.

50. (a) Well No. 1 on tract 384, the only postbid exploratory well drilled by the Pauley group on that tract, was located slightly more than a mile north of the south boundary of that tract, and somewhat east of the equidistant point between the west and east boundaries. It was drilled on the north flank of the north structure to a total depth of 13,122 feet. It encountered the Middle Pico, Lower Pico, Upper Repetto, and part of the Lower Repetto formation.

(b) The Middle Pico was encountered from 695 to 7,290 feet. A very thick section

of sand was drilled in this formation. Down to 2,750 feet, there was a low-angle dip, first southerly and then easterly; to 3,900 feet, a moderate dip northerly; and from the latter depth to 7,290 feet, substantial dip north to slightly east of north.

(c) The Lower Pico formation was encountered from 7,290 to 9,098 feet. A good section of sands was penetrated. There was substantial dip of this interval northward.

(d) The Upper Repetto was encountered from 9,098 to 11,770 feet. There was substantial dip north to slightly east of north. From 9,100 to 10,650 feet, the net sand count was 800 feet; and from 10,650 to 12,150 feet, the net sand count was 293 feet.

(e) The Lower Repetto was penetrated from 11,770 to 13,122 feet, total depth of the well. There was substantial dip slightly east of north. There were thin sands from 10,950 to 13,100 feet, with hydrocarbon presence. A production test of this interval was considered, but rejected, because it was believed that at the site of the proposed second exploratory well on this tract, the same sand section could

be observed at a more shallow depth. From 12,150 to 13,110 feet, the net sand count was 283 feet.

51. In his postbid geologic mapping of the north and south structures on tracts 375 and 384, Mr. Heck used the data and information derived from the drilling by Pauley of the exploratory wells on such tracts, and also obtained and considered logs and records of wells drilled by other companies on various channel tracts, i.e., Mobil well No. 1 on tract 385, Mobil VB-7 core hole on tract 376, Standard well No. 1 on tract 360, Gulf well No. 1 on tract 387, Texaco well no. 1 on tract 394, Humble well No. 2 on tract 334, and Mobil well No. 1 on tract 350.

52. (a) In the period from February to April 1968, Mobil drilled its No. 1 well on tract 385, which is immediately adjacent to the west to tract 384. Tract 385 was leased to Mobil, Union, Texaco and Gulf on their high bid of $35,722,000 at the general lease sale. Pauley and six members of its group bid $22,257,447 on that tract.

(b) This well was located about 1/2 mile west of the common boundary between tracts

384 and 385. It was on the anticlinal structure extending east-west through the two tracts, and penetrated formations where Mr. Heck's prebid maps indicated there were areas of assumed hydrocarbon accumulation. It was almost directly west from Well No. 1 on tract 384, although slightly farther south.

(c) This well encountered the Middle Pico from 816 to 5,250 feet, the Lower Pico from 5,250 to 6,450 feet, the Upper Repetto from 6,450 to 7,830 feet, the Lower Repetto from 7,830 to 9,300 feet, and penetrated the Upper Miocene from 9,300 to 11,620 feet, the total depth of the well.

(d) The Middle Pico was relatively sandless down to a depth of 3,120 feet, but below that depth there was rather thick bodies of Middle Pico sands. There was some Lower Pico sand recorded. Mr. Heck counted 278 feet of net sand in the Upper Repetto, and there were some slight oil shows in them. The Lower Repetto was primarily sand and silt. The Upper Miocene was primarily siltstone and claystone, with some thin sands. However, Mr. Heck counted 410 feet of net sand from 9,300 to 10,050 feet.

(e) In the vicinity of 9,300 feet, there were oil shows, noted on the mud log as "trace" to "strong trace," and a general increase in ditch gas recorded. Another trace of oil was noted at 9,500 feet. From 9,790 to 9,870 feet, there were traces of oil. At 9,870 feet, the drill stem was pulled from the well for replacement of the bit, which permitted accumulation of gas and oil in the well bore, and when drilling recommenced, there was a substantial increase in the oil and gas brought to the surface. A good show of oil and gas was encountered at 9,930 feet, and the mud weight was then increased to control the well. There were traces of hydrocarbons recorded at deeper intervals in the well.

(f) From the oil and gas shows recorded, Mr. Heck concluded that Mobil No. 1 well on tract 385 did not encounter producible horizons, but that such well was drilled slightly downdip from an accumulation of hydrocarbons in the Upper Miocene. In the sense that hydrocarbons were not reasonably producible from such well, it was a dry hole.

(g) Mobil submitted an application in the early fall of 1970 for a permit to drill a

second well on tract 385, but defendant had not acted on such application at the time of the trial of this case in 1971.

53. (a) In late 1966, Mobil drilled its VB-7 core hole near the northeast corner of tract 376, a short distance west of subject tract 375. It was located somewhat more than a mile north of Well No. 6 on tract 375, and was low downdip on the north flank of the anticlinal structure extending east-west through tracts 375 and 376.

(b) Mobil VB-7 core hole encountered the Middle Pico to 6,350 feet, and then penetrated the Lower Pico to total depth of the core hole at 6,527 feet. The dip was predominantly to the north, changing to northwest in some intervals, gradually decreasing from substantial dip at 1,950 feet, to minor at total depth.

(c) In three zones of the Middle Pico in this core hole, Mr. Heck counted 430 feet of net sand from 2,460 to 3,190 feet; 146 net feet from 3,600 to 3,850 feet; and 194 net feet from 4,015 to 4,330 feet.

(d) These Middle Pico zones corresponded with those above 2,590 feet in Well No. 2 on tract 375, and in such zones in Well No. 2, there was very little sand. Mr. Heck concluded that there was a pinching out of the sands in these zones between the Mobil VB-7 core hole and Well No. 2 on tract 375.

(e) The Mobil VB-7 core hole had no hydrocarbon shows.

54. (a) Standard well No. 1 on tract 360 was located several miles to the east and somewhat south of tract 375. The paleontologic report of numerous ditch samples shows that this well encountered the Middle Pico from 820 to 5,400 feet; none of the Lower Pico or Repetto formations; the Upper Miocene from 5,400 to 6,040 feet; the Monterey from 6,040 to 7,240 feet; the Rincon from 7,240 to 7,440 feet; the Sespe from 7,440 to 12,160 feet; and the Llajas from 12,160 to 12,854 feet at total depth.

(b) Mr. Heck considered this well useful in that it provided information as to formations depper than those drilled on tracts

375 and 384, i.e., the Sespe and Llajas formations, particularly for estimating the thickness of the Sespe formation.

55. (a) Gulf well No. 1 on tract 387, which tract is the third one due west of tract 384, was drilled at a point several miles west of Mobil well No. 1 on tract 385. The paleontologic report showed that this well encountered the Middle Pico from 863 to 3,600 feet; the Lower Pico from 3,600 to 4,680 feet; the Repetto formations from 4,680 to 8,460 feet; the Upper Miocene from 8,460 to 10,410 feet; the Monterey from 10,410 to 11,670; the Rincon from 11,670 to 11,880 feet; and the Topanga-San Onofre from 11,880 to 12,090 feet.

(b) The Sespe was not reached in this well, but Mr. Heck used the information from the well in his consideration of the regional aspects of the Upper Miocene and other formations overlying the Sespe, and particularly to project the depth of the Sespe on the subject north structure, located on tract 384 and the northern part of tract 375.

56. (a) Texaco well No. 1 on tract 394 was drilled at or near the center of that tract, which is adjacent to the north to tract 385, and immediately to the northwest of tract 384. These three tracts have a common corner point.

(b) The paleontologic report showed that this well encountered the Middle Pico from 1,270 to 9,090 feet; the Lower Pico from 9,090 to 10,710 feet; the Repetto formations from 10,710 to 13,910 feet; and the Upper Miocene from 13,910 to the well's total depth at 15,252 feet.

(c) The oil and gas shows in this well were of sufficient magnitude that Texaco ran the necessary casing and performed a production test in the interval from 12,440 to 15,247 feet. In this zone, Repetto existed above 13,910 feet, and Upper Miocene below that level. The test was continuous for almost 5 days in June 1968, and the production was 1,949 barrels of fluid, 32.6 percent oil, 18 percent water, and 49.4 percent mud. Gas was produced at an average rate of 482 MCF per day.

Three small samples of oil taken from production on the last day had an oil gravity of 33.8 percent A.P.I.

(d) While the test covered both Repetto and Upper Miocene, it is reasonable to conclude that production was from the Upper Miocene. While there were scattered hydrocarbon shows from 12,875 to 14,125 feet, significant oil and gas shows commenced at the latter depth and persisted to total depth of the well. The mud log and sonic electric log indicated that the Upper Miocene in this well was a sandstone-shale sequence, with relatively thick sand occurrences at 13,910, 14,920 and 14,780 feet.

(e) Mr. Heck considered information from this well in projecting rock thicknesses north of tract 384, and in forming his opinion as to the regional configuration of the Repetto formations.

(f) Texaco drilled a second well on tract 394 in early 1969 to a total depth of 15,456 feet. It was located about a mile northeast of well No. 1 on that tract, toward

the northeast corner. It is about 2 miles north of tract 384. At the time of the Union well blowout on January 28, 1969, it had reached total depth, casing had been installed, and plans made to test for possible production intervals. Operations were suspended on February 3, 1969, but the next day, defendant's task force (Standley-Acuff-Solanas), after reviewing Texaco's casing, mud and blowout prevention equipment programs, cleared this well to resume operations with no additional equipment. On February 6, 1969, defendant's regional office approved Texaco's application for a permit to conduct the tests, but such tests were banned by Secretary of the Interior Hickel the next day. Texaco eventually conducted such tests in September and October 1969, but the results are not in evidence, not having been released by Texaco and defendant. On September 4, 1970, Texaco filed an application to drill a third well on tract 394, and defendant issued the necessary permit during the course of the trial of this case in January 1971, but there is no evidence that the drilling of this well commenced.

57. (a) Humble well No. 2 on tract 334 was located about 35 miles west-northwest of

tract 384. It was on the 5-Mile trend in the western half of the channel, a few miles off the mainland coast, and was drilled to a total depth of 12,440 feet. Mr. Heck considered this well primarily significant for information about the Monterey formation.

(b) The Monterey formation was encountered in this well from 6,935 to 8,304 feet. Drill stem tests were run, and oil and gas were produced from various intervals of the Monterey, as follows:

Intervals tested [feet]	Duration of test [hours]	Daily production rate		Oil Gravity [A.P.I.]
		Gas [MCF]	Oil [bbls.]	
6,945 to 6,998	5	2,000		
7,044 to 7,190	2	2,500		
7,230 to 7,250	7	1,000		
7,230 to 7 460	21		430	
7,566 to 7,670	19		605	22
7,566 to 8,106	10		1,005	21
7,930 to 8,106	11		620	21

(c) The Monterey formation in this well was capable of commercial production of oil and gas, and by the time of the trial of this case, Humble had made plans to construct platforms on this tract, and defendant had announced an oil and gas discovery there.

58. Mobil well No. 1 on tract 350, located about five tracts east and two tracts south of subject tract 375, was drilled to a depth of 8,452 feet. Its logs are not in evidence. Dr. Ogle had reviewed the induction electric log. For the interval from 5,100 to 5,225 feet, a test through pipe produced a daily rate of 1,185 barrels of oil and 12 MCF of gas. Dr. Ogle believed that such interval was in the Topanga-San Onofre formation, but there is no objective evidence to support this opinion. In the interval from 5,282 to 5,421 feet, a test in the Sespe formation produced oil at the rate of 48 barrels per hour. Defendant designated tract 350 as having an official discovery. Such tract is south of the Oakridge-Montalvo trend, on which tracts 375 and 384 are located, and probably on the offshore extension of the Simi-Oxnard trend.

59. (a) After Pauley's drilling of the exploratory wells on tracts 375 and 384, and using the well logs and other data collected, Mr. Heck prepared structural, isochore and cross section maps, illustrating his professional opinion presented at the trial of this case, as to the locations, nature and extent of oil and gas formations on tracts 375 and 384.

(b) His three cross sections depict geologic formations in depth along south to north lines as follows:

(1) Cross Section One is along a line which starts near the southwest corner of tract 375, extends northeasterly straight through Well No. 3, Well No. 1, to Well No. 2, then turns northerly straight to the site of proposed Well No. 2 on tract 384, and then northeasterly straight through and somewhat beyond Well No. 1 on tract 384.

(2) Cross Section Two is along a line which commences near the southwest corner of tract 375, extends north straight through Well No. 5 to Well No. 6, then

turns slightly to the west and proceeds northerly through and somewhat beyond the Mobil VB-7 core hole described in finding 53.

(3) Cross Section Three is along a line which starts near the middle of the south boundary of tract 375, extends north-easterly straight through Well No. 4 and Well No. 7, and then a shallow Mobil core hole (2,060 feet), and terminates near the middle of the east boundary of tract 375.

(c) Cross Section One, being a drawing of the successively deeper formations from the Middle Pico through the Sespe to the Eocene to a depth of 17,500 feet, shows the anticlinal nature of both the north and south structures on tracts 375 and 384. It depicts from south to north Wells No. 3, 1 and 2 on tract 375, and Well No. 1 on tract 384. A series of seven almost vertical faults are shown in tract 375, extending to full depth of the drawing, with the northernmost at the synclinal axis between the north and the south structures. Only one such fault is shown

on tract 384, intersecting Well No. 1. Substantial displacements of the formations are indicated along the fault lines.

(1) On the north structure, the anticlinal configuration is shown to exist with respect to each of the successively deeper formations, and three of them -- the Upper Repetto, Upper Miocene, and Upper Sespe -- are shown to have a large area of oil accumulation in the broad crest of the anticline.

(2) On the south structure, the higher formations -- Middle Pico, Lower Pico, and Upper Repetto -- are steeply anticlinal, with such formations dipping rather sharply to the north and to the south from their crests in the area between Wells No. 1 and 2. Below these formations, the successively deeper formations from the Lower Repetto to the Eocene dip substantially to the north, except that in the southernmost part of the cross section, in an area of complex faulting, these formations are level or slightly dipping to the south. Seven

strata of oil bearing sands are shown in the Middle Pico updip north from Well No. 3. The upper two are designated as first Middle Pico sands, and the other five as third Middle Pico sands. In the area of the complex faulting, Well No. 3 is shown to penetrate a large oil zone, depicted as existing at depths from 5,100 to 6,100 feet throughout the Upper Miocene between two major faults. Oil sands are shown to exist at and downdip north from Well No. 2 in an area at depths around 5,000 feet.

(d) Cross Section Two, being a drawing of the successively deeper formations on the south structure from the Middle Pico through the Sespe to the Eocene to a depth of 15,000 feet, shows the anticlinal nature of the south structure at and near the west boundary of tract 375. Both the south and north edges of the drawing terminate at major vertical faults. This cross section depicts from south to north Wells No. 5 and 6, and then Mobil VB-7 core hole in the northeast corner of tract 376, near the northwest corner of tract 375. At the crests of the anticlinal formations, a major fault extends almost vertically, with

slight inclination to the south, from the sea bottom to the top of the Lower Repetto, at which point such fault bifurcates, and the two branches extend in parallel to the full depth of the drawing. The upper part of the fault is north of both Well No. 5 and Well No. 6, but the latter well intersects both branches at substantial depths.

(1) In what are designated as the first, second and third Middle Pico sands, substantial oil accumulations are shown to exist in the sharp updip of such formation between Wells No. 5 and 6, and also on the north side of the anticlinal structure, in the sharp updip of such Middle Pico sands between the Mobil VB-7 core hole and the upper reaches of the crestal fault.

(2) The Upper Repetto is shown to exist only on the north flank of the south structure, and a substantial oil accumulation is depicted in the updip of the formation.

(3) Successively deeper formations are portrayed as having substantial

downdips to the north from the central fault. South of such fault, the lower formations are level, existing in an area described as a zone of complex faulting and fracturing. Between the central fault and the south fault, and in both the Upper Miocene and in the Monterey, there are depicted large accumulations of oil, with the Monterey reservoir intersected by Well No. 6.

(e) Cross Section Three, being a drawing of the successively deeper formations on the south structure from the Middle Pico to the estimated top of the Sespe at a depth of about 10,500 feet, shows the anticlinal nature of the south structure in the eastern part of tract 375. The drawing terminates at its south edge at a major fault. Two other faults start at the sea bottom, one at and near the crest of the anticlinal structure on the Middle Pico, and the other to the north on the north flank. The latter two faults converge as they proceed to depth, joining in the Monterey, and then extending as one fault to the full depth of the cross section. Depicted thereon from south to north are Wells No. 4 and 7, and also the shallow Mobil core hole.

(1) Well No. 4 is shown to be well down on the south flank of the structure, and in the substantial updip of the Middle Pico formation to the crestal fault, there are five strata of oil bearing sands depicted. Low on the north flank is Well No. 7, and between that well and the north branch of the crestal fault, and low in the Middle Pico, there are shown two substantial strata of oil bearing sands, rising from a depth of about 5,600 to 5,000 feet in the rather steep updip of the formation.

(2) North of the crestal fault, the lower formations downdip substantially to the north, and south of such fault, such formations are level or rise gently to the south. South of the crestal fault, and even south of Well No. 4, is shown a large oil zone in the Upper Miocene. Between the crestal fault and the south fault, there is depicted in the Monterey an even larger oil zone, into which Well No. 4 is shown to penetrate.

(f) Mr. Heck prepared contour and isochore maps covering the Upper Repetto, Upper Miocene and Sespe formations on the north

structure; and the Middle Pico, Upper Repetto, Upper Miocene and Monterey formations on the south structure.

(g) For the Middle Pico only on the south structure, there are four contour maps. The first shows the general structural configuration of the Middle Pico horizons, drawn on Zone 31, a particular horizon established by paleontologic analyses of well cuttings. The south structure is shown to be anticlinal, with the crestal area having a complexity of two major intersecting east-west faults, and with the contour lines showing that from the crest at 1,500 feet, both the north and south flanks have moderate to steep downdips to indicated depths of about 4,500 feet. Each of the other three maps relates to a different Middle Pico horizon, the three horizons being designated as first, second and third Middle Pico sands, and each of such maps depicts on its pertinent horizon, an area of oil accumulation on each flank of the south structure, with the only contour lines shown being those directly or closely related to such areas.

(1) With respect to the first Middle Pico sands, the area of oil accumulation

on the south flank extends from the east to the west boundary of tract 375, is about 1/5 mile wide, and lies between the contour elevations 1,100 and 2,200 feet, with some variations between those limits. The area of oil accumulation in the first sands of the north flank is shown to commence at about the middle of tract 375 and extent to the west boundary, is also about 1/5 mile wide, and lies between contour elevations 1,050 and 1,700 feet, with some variations.

(2) With respect to the second sands, the area of oil accumulation on the south flank is about 1/2 mile long and about 1/5 mile wide, commencing at a fault and terminating at the west boundary of tract 375, lying between contour elevations 1,800 and 3,200 feet. On the north flank, the area of oil accumulation in the second sands is similar in shape and sixe to that above in the first sands, and lies between contour lines 1,600 and 2,800 feet.

(3) With respect to the third sands, the area of oil accumulation on the south

flank is similar in size and shape to the corresponding area on the map of the first sands, with the exception that while it extends to the west boundary of tract 375, it falls short by about 1/8 mile of reaching the east boundary. It lies between contour lines 1.900 and 3,500 feet. On the north flank in the third sands, the area of oil accumulation is depicted similar in size and shape to those above in the first and second sands, and lies between contour lines 1,800 and 3,100 feet.

(h) One contour map covers the top of the Upper Repetto on both flanks of the north structure, and also on the north flank (there being none shown on the south flank) of the south structure. The common boundary between the north and south structures is depicted to be a major east-west fault along the synclinal axis extending through the norhtern part of tract 375. To the north, the Upper Repetto mapping covers the anticlinal formation of the north structure extending across the anticline to deep on the north flank to a major east-west fault crossing through the middle of tract 384; and to the

south, to another major east-west fault extending along the anticlinal axis of the south structure. The Upper Repetto is shown to be complicated on both the north and south structures by cross faulting, with contour lines showing displacements of the formation at fault lines.

(1) With respect to the north structure, the Upper Repetto is depicted as an elongated domelike structure, with its contour lines being continuous along its north and south flanks and around its east end, truncated at its west end where the contour lines terminate in succession at two major cross faults shown on either side of the western boundary of tract 384. In general, the contour lines are from 6,700 feet at the crest and at 100-foot intervals along and around the dome to a depth of 7,900 feet.

(2) Oil accumulation in the Upper Repetto of the north structure is depicted as existing in a large central area from the crest, circumscribed generally by contour lines at 7,150 feet, such area

being 3 miles long and almost a mile wide. Somewhat more than half of this area appears to be in tract 384, somewhat less on tract 375, and a small part on tract 385 to the west of tract 384.

(3) With respect to the south structure, and only its north flank, the Upper Repetto drops generally from 4,100 feet at the fault along the anticlinal axis to about 7,000 feet at the synclinal axis between the north and south structures. The oil accumulation in this area is depicted as existing between contour lines 4,500 and 5,000 feet along the eastern half of the north flank, and between 4,500 and 6,000 feet along the rest of the north flank of the south structure. Such oil areas are considerably narrower in width than the oil area portrayed on the north structure, but do extend entirely across tract 375, segmented by four cross faults in the eastern half of the south structure, with the width of the oil area varying within the segments.

(i) Another contour map covers the Upper Miocene on both flanks of the north

structure, and on the south flank of the south structure. The fault along the synclinal axis between the north and south structures is shown, and the two structures are portrayed as basically anticlinal.

(1) The north structure on this map is depicted as an elongated domelike anticline, truncated at a major cross fault within but near the western boundaries of tracts 384 and 375. Its contour lines for the Upper Miocene are continuous along its north and south flanks and around its eastern end, but terminate at the west at the cross fault. Such contour lines are from 9,900 feet at the crest and at 100-foot intervals down both flanks to a depth of 10,700 feet on the south flank and to even greater depths on the north flank.

(2) Oil accumulation in the Upper Miocene of the north structure is shown to exist in a large central area, circumscribed by the contour lines down to 10,350 feet, such area being almost 3 miles long and somewhat less than a mile wide. In contrast to the Upper Repetto on the north

structure, about 2/3 of the Upper Miocene oil accumulation on the north structure is shown to be on tract 375, and the rest on tract 384.

(3) With respect to the south structure, and only its south flank, the Upper Miocene contour mapping is best described by separate mention of its western and eastern halves, because of their substantially different natures.

(4) In the western half of the south flank, the Upper Miocene area is enclosed on the north by a major east-west fault, on the east by a major cross fault, and on the south by a major east-west fault. The contour lines increase in depth from 4,300 feet at the north fault to 5,300 feet at the south fault. This entire area is depicted as being oil and gas bearing, with the gas accumulation being a substantial area adjacent to and along most of the north fault, and the rest being a larger area of oil accumulation.

(5) With respect to the eastern half of the south flank of the south structure,

the Upper Miocene mapping is bounded on the north by a major east-west fault, on the west by the previously mentioned cross fault, and on the south by a major east-west fault. Within this area, the contour lines are shown to rise from 4,600 feet at the north fault to 3,800 feet at the south fault, with the direction of updip of the formation southeasterly, so that the high levels of the Upper Miocene are in the southeastern part of this eastern half. The southeastern part of such area is shown to be a substantial area of gas accumulation, with the rest of the area depicted as oil bearing, except for a relatively small part designated as water bearing in the northwest corner.

(j) Another contour map covers the Monterey on the south structure. As in the case of the Upper Miocene formation above, a major central cross fault divides the area into western and eastern halves, with each half bounded on the north and on the south by major east-west faults.

(l) In the western half of this mapping of the Monterey, the formation is shown to updip from the cross fault, where the contour elevation is 6,800 feet, to the west and northwest to the highest contour level of 5,000 feet in the northwest corner of the area. Most of the area, that part from the contour elevation 6,300 to and somewhat beyond the west boundary of tract 375, is shown to be oil bearing.

(2) In the eastern half of this mapping of the Monterey, the formation is shown to updip to the south and southeast, with the lowest contour line near the north fault at 6,400 feet, with the rise to 5,500 feet at the south boundary of tract 375, and then to 5,200 feet in the small southeastern part of this area located in the adjacent tract. The entire area of this eastern half of the Monterey formation is depicted as oil bearing.

(k) Another contour map covers the Sespe formation on both flanks of the north structure. Such map presents a structural

formation similar to that shown on the map of the Upper Miocene on the north structure. The Sespe is depicted as a domelike anticline, truncated by the major fault close to the western boundaries of tracts 384 and 375. Its contour lines are continuous along the north and south flanks and around the eastern end. Oil accumulation in the Sespe of the north structure is shown to exist in a large central area, circumscribed by the contour lines from the crest at 13,600 feet down to 14,150 feet, such area being more than 2-1/2 miles long and more than 1/2 mile wide. More than 2/3 of such area is on tract 375, and the rest on tract 384.

60. (a) Under Mr. Heck's supervision, isochore maps were prepared, showing the estimated thicknesses of net sands in pertinent areas of tracts 375 and 384. Each isochore map relates to a specific formation, e.g., Upper Repetto, and each covers the area or areas of assumed accumulation of oil and gas, as portrayed on the corresponding contour map. As to each formation, Mr. Heck determined the net sand thicknesses as indicated from the well data of Pauley's exploratory wells on tracts 375 and 384, as well as some nearby wells. He

projected such thicknesses between the various wells to cover pertinent areas of a given formation. The area of oil and gas accumulation, as shown on a particular contour map, and its net sand thicknesses, as estimated on the corresponding isochore map, were used in the calculation of the volume of reservoir rock in the particular area of oil and gas accumulation on a certain formation. The isochore map for the Upper Repetto, covering both tracts 375 and 384, is used to illustrate the methodology involved in the isochore mapping.

(b) The isochore map for the Upper Repetto shows a series of nine lines drawn across tracts 375 and 384, spaced apart in succession from south to north. Their commencements are at points spaced along the east boundary of tract 375. They curve in parallel to the northwest, together covering the areas of the north and south structures. From the southernmost line, where no net sands exist, this map shows a progressive thickening of the net sands in a northeast direction. The rate of increase is 100 feet from line to line, and thus the lines are labeled from zero thickness to 800 feet in succession from south to north.

(c) The first isochore line, or the one indicating no sand thickness, and thus marked as the zero line, is located because there were no net sands in the Upper Repetto in Wells No. 1, 3, 4, 5 and 6 on tract 375. This line crosses tract 375, immediately above the area in which such wells are located.

(d) The 100-foot isochore line is drawn just south of Well No. 2, because that well has 110 feet of net sands in the Upper Repetto. This line and the 200-foot line curve to the northwest in relation to the location of the 300-foot line. The 200-foot line is a projection of the net sand thicknesses between the locations of the 100-foot and 300-foot lines.

(e) The 300-foot line is placed in relation to Well No. 7 on tract 375 and Mobil Well No. 1 on tract 385. The former well has a net sand thickness of 328 feet in the Upper Repetto; and the latter, 278 feet. This line extends across tract 375, immediately south of Well No. 7, curving northwesterly across the extreme southwest corner of tract 384 into tract 385, where it is just north of Mobil Well No. 1.

(f) The four isochore lines -- 400-foot to 700-foot -- spaced between the 300-foot and 800-foot lines, are projections throughout a large area of tracts 375 and 384 of the net sand thicknesses established by the data relating to the 300-foot and 800-foot lines.

(g) The 800-foot isochore line starts in the extreme northeast corner of tract 375, and extends northwesterly to and beyond Well No. 1 on tract 384. In the latter well, there is a net sand thickness of 800 feet in the Upper Repetto.

61. (a) Mr. Rakestraw, using the same method employed by him in his prebid engineering evaluations of tracts 375 and 384, prepared in consultation with others Pauley's postbid engineering and economic evaluations of such tracts, which he completed on October 1, 1970. He served as plaintiffs' principal witness on that subject matter, and based his postbid evaluations on the geologic interpretations of the tracts as presented by Mr. Heck in his testimony. Upon review of all of the data obtained from the exploratory drilling

operations on the tracts, he concluded that the methodology and reservoir parameters applied to the prebid evaluations in January 1968 were applicable to the 1970 evaluations.

(b) In computing the volumes of reservoir rock, he relied upon Mr. Heck's postbid contour and isochore maps, and accepted as established the existence and areal extents of oil and gas accumulations on various formations in the north and south structures, and the thicknesses of reservoir materials, all as shown on such maps. With respect to each reservoir in the north structure which lay across the common boundary between tracts 375 and 384, he allocated to each tract that part of the reservoir lying within such tract, and he otherwise confined his calculation of any reservoir volume within the boundary limits of either tract 375 or tract 384.

(c) With respect to the following oil and gas reservoirs shown on the pertinent contour maps, Mr. Rakestraw computed their productive volumes of reservoir materials in acre-feet as follows:

Tract 375

South structure		
Middle Pico (south flank)		
1st zone	31,634	
2nd zone	4,228	
3rd zone	21,497	
Middle Pico (north flank)		
1st zone	20,312	
2nd zone	11,790	
3rd zone	13,331	102,792
Upper Repetto (north flank)		29,092
Upper Miocene (south flank)		548,925
Monterey (south flank)		1,098,577
North Structure		
(part within tract 375)		
Upper Repetto		173,133
Upper Miocene		441,647
Sespe		515,018
Total reservoir volume in tract 375		2,909,184 acre-feet

Tract 384

North Structure		
(part within tract 384)		
Upper Repetto	315,718	
Upper Miocene	183,023	
Sespe	190,763	
Total reservoir volume in tract 384		689,515 acre-feet

(d) With respect to each reservoir on each formation, Mr. Rakestraw used the same methodology and parameters which he had used on his prebid evaluations, and calculated the volume of stock tank oil in place, the gas-oil ratio, and the amounts of recoverable oil and gas, utilizing both primary and secondary recovery on most but not all of the reservoirs. He took into consideration that there would be some areas of undrained oil and gas due to such factors as economic limitations on location of platforms and wells. He calculated recovery rates, showing declining recovery over a period of years, and considered that due to the higher costs of offshore development operations, recovery rates at termination of operations would be higher than in the case of onshore production.

(e) For the purposes of his evaluation of tracts 375 and 384, Mr. Rakestraw prepared maps showing the productive limits of the various reservoirs, and setting forth the planned locations of platforms and both producing and water injection wells, the latter being for the purpose of accomplishing secondary recovery of oil and gas.

(f) On the south structure, Mr. Rakestraw planned the construction of three platforms, with Platform A having 26, Platform B having 57, and Platform C having 62 producing wells. He planned three platforms and 183 producing wells for the north structure. Some wells were intended to produce from more than one horizon or formation. The production from each horizon in a well is known as a well completion. A total of 430 well completions were planned for the 330 wells contemplated on the north and south structures.

(g) Mr. Rakestraw calculated the quantities of oil (in barrels) and of gas (in thousand cubic feet) economically producible from the reservoirs shown on the contour maps. Such figures are set forth in the following schedules. Those in parentheses represent primary recovery only. Secondary recovery was not contemplated in some reservoirs, particularly in deeper formations. The figures not in parentheses represent Mr. Rakestraw's computation of producible oil and gas utilizing both primary and secondary recovery, or in some instances only primary recovery.

Tract 375

	Oil [barrels]		Gas [thousand cubic feet]	
South Structure				
Middle Pico				
South flank				
1st zone	18,540,814	(12,265,050)	10,099,317	(7,137,666)
2nd zone	2,452,903	(1,585,500)	1,977,911	(1,222,897)
3rd zone	12,409,992	(7,999,118)	11,979,687	(6,616,676)
North flank				
1st zone	11,610,050	(7,962,304)	5,019,883	(3,870,017)
2nd zone	6,861,567	(4,480,200)	4,893,977	(3,148,249)
3rd zone	7,666,334	(4,892,477)	7,039,518	(4,193,551)
Upper Repetto				
North flank	9,891,173	(7,199,843)	20,544,311	(12,387,975)
Upper Miocene				
South flank	232,772,143	(140,701,033)	369,109,444	(235,557,420)
Monterey				
South flank	137,322,075	---	186,758,000	---
North structure				
(within 375)				
Upper Repetto	51,011,907	(30,125,142)	72,835,899	---
Upper Miocene	55,205,875	---	168,316,583	---
Sespe	43,261,512	---	185,737,228	---

Tract 384

North structure				
(within 384)				
Upper Repetto	91,712,570	(54,303,496)	130,328,390	---
Upper Miocene	22,879,250	---	69,756,287	---
Sespe	16,204,092	---	68,796,772	---

(h) Mr. Rakestraw's calculations of actually producible oil and gas were generally somewhat higher than the above figures relating to economic recovery. For example, with respect to the Upper Repetto reservoir within tract 384, as listed above, his calculation was that there were 54,303,496 barrels of actually producible oil, which amount he reduced to 51,011,907 barrels. Such reductions were made because there would be undrained areas in reservoirs due to economic limitations on the number and locations of platforms and wells, and because the higher costs of offshore operations would not economically permit extended continuance of production to the lower rates of recovery practical in on-shore development.

(i) Mr. Rakestraw prepared a separate evaluation for each of the north and south structures on the subject tracts. With respect to each, he calculated the gross oil and gas economically producible in both primary and secondary recovery, determined the total future income based on prevailing market prices for oil and gas in the area as of March 15, 1969, reduced such income by the 1/6 royalty rate payable to the lessor, figured the rates of

recovery declining over the period of operations estimated as being 27 years for primary and 38-40 years for secondary recovery, calculated the timing and amounts of capital and operating costs (direct and indirect) for facilities, drilling and all other operations, and arrived at the net future income to the lessees on each of the north and south structures.

(j) As thus determined, the evaluation of the entire north structure (irrespective of its lying in both of subject tracts) was as follows:

	Primary Recovery	Primary and Secondary Recovery
Gross oil - bbls.	209,923,804	253,340,746
Gross gas - MCF	669,381,931	579,398,397
Gross income	$663,935,330	$762,408,701
Capital costs	$134,929,200	$143,403,400
Operating costs	$133,513,068	$131,646,101
Net income	$395,493,062	$437,359,200

(k) The same evaluation of the south structure was as follows:

	Primary Recovery	Primary and Secondary Recovery
Gross oil - bbls	310,028,490	417,241,751
Gross gas - MCF	448,903,242	340,885,090
Gross income	$784,961,799	$1,038,045,319
Capital costs	$121,947,300	$147,221,600
Operating costs	$ 93,035,144	$176,251,129
Net income	$569,979,355	$714,572,590

(l) To arrive at separate engineering and economic evaluations of tracts 375 and 384, Mr. Rakestraw made an "equity" determination for the purpose of allocating between the two tracts the value of the north structure. As shown by the geologic mapping used, three of the reservoir formations of the north structure, the Upper Repetto, Upper Miocene and Sespe, underlay both tracts across their common boundary. As to each of such formations, he segregated between the two tracts, the pertinent volumes of recoverable oil and gas, considering both the potential and economically recoverable amounts, and also determined and allocated between the two tracts the gross income realizable. He then computed the gross income allocated to each tract from all three formations. This gross income allocated to tract 375 was 58.83 percent, and that allocated to tract 384 was

41.17 percent, of the total gross income from all three of the pertinent formations. These percentages were Mr. Rakestraw's equity factors in his allocation of the value of the north structure between the two tracts.

(m) A summary of Mr. Rakestraw's engineering and economic evaluation of tract 384, which by application of the equity factor of 41.17 percent includes only that portion of the north structure lying within such tract, is as follows:

	Primary recovery	Primary and Secondary recovery
Gross oil - bbls.	86,425,630	104,300,385
Gross gas - MCF	275,584,541	238,538,320
Gross income	$273,342,175	$313,883,662
Capital costs	$55,550,352	$59,039,180
Operating costs	$54,967,330	$74,783,700
Net income	$162,824,493	$180,060,732

As thus calculated, the future net income to be anticipated from the development of tract 384 is $162,824,493, utilizing only primary recovery techniques, and with the results of secondary recovery operations being considered, such

future net income is increased to $180,060,782. At a discount of 6 percent per year, which was the rate used by Mr. Rakestraw, the present worth of such future net income is $79,836,757 under primary recovery, and $82,543,882 with secondary recovery utilized.

(n) A summary of Mr. Rakestraw's engineering and economic evaluation of tract 375, which includes all of the south structure, and by application of the equity factor of 58.83 percent, also that portion of the north structure underlying such tract, is as follows:

Primary Recovery	58.83 Percent of North Structure	South Structure	Total Tract 375
Gross oil - bbls.	123,498,174	310,028,490	433,526,664
Gross gas - MCF	393,797,390	448,903,242	842,700,632
Gross income	$390,593,155	$784,961,799	$1,175,554,954
Capital costs	$ 79,378,848	$121,947,300	$201,326,148
Operating costs	$78,545,738	$ 93,035,144	$171,580,882
Net income	$232,668,569	$569,979,355	$802,647,924

Primary and Secondary recovery

	58.83 Percent of North Structure	South Structure	Total Tract 375
Gross oil - bbls.	149,040,361	417,241,751	566,282,112
Gross gas - MCF	340,860,077	340,885,090	681,745,167
Gross income	$448,525,039	$1,038,045,319	$1,486,570,358
Capital costs	$ 84,364,220	$147,221,600	$231,585,820
Operating costs	$106,862,401	$176,251,129	$283,113,530
Net income	$257,298,418	$714,572,590	$971,871,008

As thus calculated, the future net income to be anticipated from the development of tract 375 is $802,647,924, utilizing only primary recovery techniques, increased to $971,871,008 with secondary production included. At the discount rate of 6 percent per year, the present worth of such future net income is $448,010,330 under primary recovery, and $490,473,770 with secondary recovery utilized.

(1) Mr. Rakestraw recomputed his engineeerng and economic evaluations of tracts 375 and 384 on the basis of the oil and gas prices in effect on February 7, 1969. These prices were somewhat less than those used in his foregoing calculations. With such lesser prices, he concluded that the future net income to be anticipated from the development of tract 384 is $151,186,546, utilizing only primary recovery techniques, increased to $166,293,661 with secondary production included, and that the present worth of such future net income discounted at the 6 percent rate is $73,462,530 under primary recovery and $75,626,662 with secondary recovery utilized. In his like recomputation of tract 375, he concluded

that the future net income is $746,362,449 for primary recovery alone, increased to $899,518,331 by secondary production, and that the present worth of such future net income discounted is $414,125,593 under primary recovery and $451,441,800 with secondary recovery utilized.

62. (a) The final step in the preparation of an engineering and economic evaluation of an oil and gas property is an assessment of the probability of success of the projected development operations in accordance with the overall evaluation. A chance factor is determined, expressed as a percentage or success ratio, which is applied to the total evaluation. The chance factor determined for Pauley was 74.555 percent for tract 375, 68.582 for tract 384, or a composite chance factor of 73.560 percent for both tracts.

(b) The chance factor is prepared by geologists and engineers and submitted to the company's management for use in assessing fair market value of the oil and gas property. The methodology is confidential, and each oil company employs a somewhat different procedure.

Mr. John M. David was Pauley's officer charged with determination of the chance factor on the pertinent tracts. This was accomplished at a 2-day meeting he held in October 1970 with various of Pauley's personnel and retained consultants, including James B. Anderson, a petroleum engineer who was Pauley's Vice President of Exploration; Richard Hester, consulting geologist; Edwin B. Edwards, geologist employed by Pauley; Jack R. Severns, a consulting well log analyst and petroleum engineer; George K. Peters, petroleum engineer employed by Pauley; Mr. Heck, the principal geologist on the evaluations; and Mr. Rakestraw, the principal petroleum engineer on the evaluations. Each of these conferees had been involved in either the geologic or engineering and economic evaluation of the tracts, and each participated in discussions concerning the quality and quantity of data used, and in reaching the conclusions adopted by Mr. David as the basis for determination of the chance factor.

(c) Mr. David became a petroleum engineer in 1949, when he received his B.S. degree in petroleum engineering from Tulsa University. He served as a petroleum engineer

in succession for Atlantic Refining Company and Pauley, each for 5 years, and then practiced for 4 years as a private consultant. Commencing in 1965, he was employed as manager and later as Vice President of Economics and Evaluations for Pauley, and then commencing in January 1969 to the time of trial, as Vice President of Production and Engineering for Pailey. Throughout his professional career, Mr. David had extensive practice and experience in reservoir engineering and evaluations of oil and gas properties, ultimately assuming responsibility for Pauley's production and drilling activities.

(d) Mr. David prepared a chart which graphically portrays the methodology used and conclusions reached in determining the chance factor. Each of the reservoir formations on the north and south structures is listed. As to each reservoir formation, there is a column breaking down by reservoir the total oil reserves of tracts 375 and 384 as determined by Mr. Rakestraw. By the procedures hereinafter outlined, each of the reservoirs was assigned a separate chance factor. Each such chance factor was then weighted in accordance with the percentage relationship of the reserves in the

particular reservoir to the total reserves of both tracts, to arrive at a weighted chance factor for each reservoir. The total of the weighted chance factors of the various reservoirs was the composite chance factor for both tracts, i.e., 73.560 percent. In order to arrive at the chance factor for tract 375, Mr. David took the same chance factor assigned for each reservoir in such tract, and weighted it in accordance with the percentage relationship of the reserves in such reservoir to the total reserves in tract 375. The total of the weighted chance factors in tract 375 was the chance factor for such tract, i.e., 74.555 percent. A separate computation in the same manner was made for tract 384 for a chance factor of 68.582 percent for that tract.

(e) To arrive at the separate chance factor for each reservoir, before the weighting of such factor, ten categories of the overall evaluation, as hereinafter listed and described, were considered. Each such category heads a column of Mr. David's chart. As to each reservoir, a percentage rating was assigned to each of the ten categories. This assessment as to each category was a determination of the degree of accuracy of the quantity and quality

of the supporting data assembled and utilized and the interpretation thereof with respect to each category, taking into consideration all other aspects of the entire evaluation. Each category rating made was the combined judgment of the conferees, with any differences of opinion among them resolved by continued discussions until agreement was reached, with such discussions directed by Mr. David in accordance with Pauley's method of determining the overall chance factor. The chance factor for each reservoir was determined by multiplying in decimals with an accumulating product the percentage ratings from one to another throughout the ten categories. For example, for one reservoir listed in Mr. David's chart, the successive ratings for the categories were in percentages of 100, 95, 90, 100, 95, 100, 100, 102, 93 and 100, with a resulting chance factor for that reservoir of 77.1 percent (1.00 x 0.95 x 0.90 x 1.00 x 0.95 x 1.00 x 1.00 x 1.02 x 0.93 x 1.00 = 0.771). With respect to all of the reservoirs, the lowest category rating was 85 percent, and the highest 102 percent. The ten categories considered for each reservoir are as follows:

(1) Structure Closure. The percentage rating for this category is the chance that the assumed reservoir is actually closed, i.e., that there is the necessary trapping mechanism for the holding of hydrocarbons. It does not relate to the extent of the structure, as the risk factor as to amount was assessed in the category of Size of Structure (Fillup). Of the 14 reservoirs, 13 were rated 100 percent in this category, with the Sespe rated 95 percent. The 100 percent rating was based on the opinion of the geologists who worked on the geologic evaluation that the data they had was very definitive on this category.

(2) Amount of Oil Sands. The geologists in conjunction with the well log analyst made percentage assessments of the strength and amount of data supporting the sand counts used in each reservoir in the geologic evaluation. The percentage ratings varied from a low of 85 percent for the Sespe and Repetto reservoirs in the north structure, to the high of 100 percent for one of the Monterey reservoirs in the south structure. Other ratings were 90, 93 and as percent.

(3) Presence of Oil. This category relates only to the presence of oil, not an assessment of the quantity thereof. The percentage ratings in this aspect of a reservoir chance factor determination were primarily the function of the geologists, and they undertook to distinguish between minor shows and significant indications of oil as shown in the well logs of the various exploratory wells drilled on the subject tracts. Of the 14 reservoirs, four were rated 85 percent in this category; three, 90 percent; one, 93 percent; one, 95 percent; and five, 100 percent.

(4) Cost Data (Capital). The assessment of the percentage in this category was primarily the function of the petroleum engineers. Mr. Peters who had worked up the capital costs of the projected development operations on the two tracts expressed his opinion that he had been pessimistic in assessing various cost items involved, and that savings could be realized in quantity purchasing of pipe and other materials, which would result in reduction of the projected overall capital

costs. For 13 of the reservoirs, this category rating was assessed as 102 percent, and on the remaining reservoir (Sespe) as 95 percent.

(5) Recovery Data. This category relates to the reservoir parameters and other recovery data which resulted in the amounts of recoverable oil and gas projected in the development operations planned. This determination was primarily the function of the reservoir engineers, and their judgment was that such data was the very best obtained, and represented what would have happened had the program of exploration and development of the tracts continued. For nine reservoirs, this category rating was 100 percent; for three reservoirs, 95 percent; and for two reservoirs, 90 percent.

(6) Economic Data (Price). This category concerns the prices used for recoverable oil and gas in the overall evaluation. For eight reservoirs, the percentage rating was 100 percent; and for the six other reservoirs, 93 percent.

(7) Production Restriction. This category relates to the capability of the planned wells to produce and to the initial production potentials of the wells in the overall evaluation. Each of the reservoirs was assigned a 100 percent rating.

(8) Overlap of Other Structure. Consideration was given in this category as to whether or not there was evidence that any reservoir might overlap its calculated limits, and thus include additional productive areas. Where there was little possibility of such overlapping, a rating of 100 percent was assigned. The only overlap believed to exist was in the Upper Repetto of the north structure, which reservoir was assigned a rating of 102 percent. The other 13 reservoirs were rated 100 percent.

(9) Size of Structure (Fillup). This category relates to the accuracy of the actual size of the reservoir as mapped by Mr. Heck. A geologic structure is usually larger than the oil and gas reservoir contained therein. An assessment

had to be made with respect to each of the pertinent reservoirs, as to whether or not oil bearing sands existed throughout the reservoir area as mapped by Mr. Heck, in other words, whether there was a "fillup" of the structure to the extent of the reservoir as mapped. A 90 percent rating means that there is a 90 percent chance that the reservoir accumulation of gas and oil will be as mapped by Mr. Heck. One reservoir was rated 100 percent; four, 95 percent; eight, 90 percent; and one, 85 percent.

(10) Additional Productive Zones. An oil and gas reservoir may have several productive zones within the structural formation involved. If no additional productive zones were indicated in addition to those included in the overall evaluation with respect to a particular reservoir, the category rating for that reservoir was 100 percent. Of the 14 reservoirs, seven were rated 100 percent; and seven, 102 percent. The larger rating was an assessment of the chance that there would be in addition to the producing zones contemplated in the overall evaluation, other producing zones in various of the reservoirs.

(f) In accordance with the methodology employed on the ten categories with respect to each reservoir, the lowest reservoir chance factor was 59.9 percent on the Sespe on the north structure, and the highest was 93.9 percent for the Upper Repetto on the south structure. As to the other 12 reservoirs, reservoir chance factors ranged from 66.6 to 70.4 percent on five reservoirs, from 73.1 to 77.1 percent on four reservoirs, were 82.8 and 92.1 respectively on the two Monterey reservoirs, and 93 percent on one of the Middle Pico reservoirs.

63. (a) William R. Pagen, Pauley's president, testified in this case as to the present value of tracts 375 and 384, having reviewed Mr. Rakestraw's engineering and economic evaluations and Mr. David's chance factor calculations. In assessing the present value, Mr. Pagen relied upon his experience as an oil company executive.

(b) Mr. Pagen graduated from the U.C.L.A. School of Business Administration in 1946, with a major in accounting, banking and finance, and later completed the executive training course in the graduate school there.

He is a registered public accountant in California. He has been employed by Pauley and its predecessor company since 1948, serving at first on accounting and tax matter assignments, and advancing to the position of executive vice president of Pauley upon its incorporation in 1958. He has been its president since 1963. He has had extensive experience in acquisition and sales of oil and gas properties.

(c) Mr. Pagen took Mr. Rakestraw's figure of the total future net income realizable from both tracts, i.e., $1,151,931,790, which he discounted at 6 percent per year, to arrive at the sum of $570,000,000. He then reduced the latter figure by the chance factor of 73.56 percent determined by Mr. David for both tracts, the result being approximately $421,000,000. To this latter figure, he applied a present value factor of 75 percent, and thus reached the conclusion that the present value of both tracts was $316,000,000.

(d) Using Mr. Rakestraw's recomputation of his engineering and economic evaluations of tracts 375 and 384 on the basis of oil and gas prices in effect on February 7, 1969, Mr.

Pagen took the figure of the total future net income thus realizable from both tracts -- $1,065,811,992 -- to which he applied the discount rate of 6 percent to reach $527,068,042. Application of the 73.56 chance factor reduced this latter figure to $388,000,000 which in turn was reduced by the 75 percent present value factor to the sum of $291,000,000. Mr. Pagen concluded that this latter sum was the present value of both tracts, using the oil and gas prices in effect on February 7, 1969.

(e) Mr. Pagen testified that his method of evaluation had been consistently used by Pauley on its other oil and gas properties, was commonly used in the oil industry, and had been approved by two major banks in establishing Pauley's revolving credit accounts.

64. (a) Another witness who testified for plaintiffs concerning the fair market value of tracts 375 and 384 was Gene Edward Roark, president of Husky Oil Ltd., a Canadian corporation, which is the sole owner of Husky Oil Company of Delaware, one of the plaintiff corporations in this case.

(b) Mr. Roark received a B.S. degree in petroleum engineering from the University of Tulsa in 1942. From 1944 to 1951, he was employed as a petroleum engineer by the Atlantic Refining Company, reaching the position of senior engineer in charge of unitization, secondary recovery and research coordination. In 1951, he joined James A. Lewis Engineering, Inc., and became its president in 1963, the same year he was elected to the board of directors of Husky Oil Ltd. The Lewis company engaged in petroleum engineering consultation in the fields of evaluation and appraisal of oil and gas properties, field development projects, contract operations and secondary recovery programs throughout the United States and the free world. During his career with the Lewis company, Mr. Roark prepared and supervised the preparation of appraisals of oil and gas properties which resulted in transactions involving considerations paid in excess of a billion dollars. Besides appraisals of properties located elsewhere, Mr. Roark appraised numerous properties located throughout the oil producing regions of California. He represented oil companies, railroads, banks, insurance companies, investment bankers and various governmental units. He served as an expert witness before courts and state

commissions in proceedings involving petroleum engineering and evaluation issues. He became president of Husky Oil Ltd. in 1967. Husky and its subsidiaries operate as an integrated oil enterprise engaged in exploration, production, refining, and marketing operations with respect to petroleum. In 1970, Husky concluded plans and arrangements for an oil exploration program for 1970 through 1972 involving a total investment of approximately 37-1/2 million dollars. Mr. Roark supervised and made all final decisions with respect to this program.

(c) In early November 1970, Mr. Roark attended Pauley's office at Los Angeles, and for several days reviewed in consultation with the various persons who had worked on the project, Mr. Heck's geologic mapping and interpretations and Mr. Rakestraw's engineering and economic evaluations of tracts 375 and 384, together with the data which had been accumulated and used by Pauley. In further preparation for the assessment of fair market value of the tracts, Mr. Roark thereafter read the transcripts of the testimony of Mr. Heck, Mr. Rakestraw, Mr. Severns, and other technical witnesses in this case, correlating the testimony with related exhibits in evidence, such as

maps, charts and other documents. He also held staff meetings of his company's engineers and geologists, and conducted discussions of the matters of record. His ultimate conclusion was that he was in substantial agreement with Pauley's geologic and engineering and economic evaluations of the tracts. He conceded that the reservoirs involved were not proven reserves, because no production tests had been run on any of the exploratory wells drilled, but concluded that the bulk of them were probable, with some only possible, reserves. His distinction between probably and possible reserves was that there was less geologic confirmation of reserves in the latter category.

(d) Mr. Roark testified that the fair market value determination of an oil and gas property contemplates a transaction between a buyer and seller, and that there is a preparation of what is commonly known in the oil industry as an economic analysis of the property, which is made available to both the buyer and seller, and which serves as the basis for accomplishment of the sales transaction. The economic analysis, as described in Mr. Roark's testimony, is prepared in the same manner employed by Pauley: First, geologic

studies are made, based on geophysical work, seismic surveys, data from the drilling of wells in the region in which the oil and gas property is located, to compile an interpretation of the geology underlying the tract; the petroleum engineers then estimate the oil and gas in place, relying upon the geologic interpretation made; then, the petroleum engineers make a forecast of the work to be done, the wells to be drilled, production facilities to be installed, and the rates at which oil and gas will be produced; and finally the economic analysis contains an annualized forecast of production, operating income, operating costs, net operating costs, and the cash flow to be generated from the property. Additional factors which Mr. Roark said are to be considered are whether there is a crude deficit in the market available to the oil and gas property; the size of such property in relation to the chance of finding reserves in a geologic formation with multiple reservoirs; and the position of the property with respect to known oil producing trends in the geologic province in which the property is located. Mr. Roark considered that competitive bid prices do not provide any measure of fair market value.

(e) Mr. Roark's opinion was that the fair market value of tracts 375 and 384 was 75 cents per barrel of oil in the ground, and that based on a quantity of 520 million barrels, such value amounted to $390 million. Mr. Rakestraw's original evaluation showed 519,952,796 barrels of primary recovery oil in both tracts, and his supplementary evaluation, 518,536,127 barrels. Mr. Roark concluded that the 75 cents per barrel figure would remain valid for the period from February 7 to June 30, 1969, because the values of oil and gas properties do not change rapidly. Mr. Roark stated that his company had recently purchased oil and gas property in Wyoming for $1.47 per barrel of oil in the ground, with this higher figure based on the fact that some of the property was under production, and because such property would not have been as costly to develop. His 75 cent price on subject property was considered reasonable by him because it was attractive property with reserves documented by wells already drilled and vast amount of geologic work, and because the parties to a sales transaction would expect rising prices for oil and gas, as then contemplated in the petroleum industry. The price figures used by Mr. Rakestraw were $2.92 per

barrel of oil in his original evaluation, and $2.77 per barrel in his supplementary evaluation.

65. (a) The third witness who testified for plaintiffs concerning the fair market value of tracts 375 and 384 was Edward L. Steiniger, who had retired in June 1968 as chairman of the board of directors and chief executive officer of Sinclair Oil Corporation, continuing to serve thereafter as a director of several large corporations.

(b) Mr. Steiniger graduated from Pace College in 1925, and then was employed by Sinclair as a clerk in its foreign department, concurrently completing 2 years of graduate studies in economics and Spanish at New York University. In 1928, he was transferred by Sinclair to Venezuela as a field clerk, where the Sinclair operations were the mapping of large areas of land in petroleum exploratory studies and surveys being conducted by geologists, geophysicists and petroleum engineers. He became manager of Venezuelan operations by 1935, and he was then returned to Sinclair headquarters in New York City, serving as liaison employee on the Venezuelan activities until 1940. He served Sinclair again in Venezuela from 1940 to 1950, during which time,

Sinclair developed various properties there, engaging in production of oil, and building pipelines, natural gas plants, and oil refineries. In 1950, he was returned to New York City, where for the first year he coordinated the activities of Sinclair's Venezuelan subsidiary with the parent corporation, particularly in the marketing of crude petroleum. In 1951, he became Sinclair's executive vice president in charge of operations, both domestic and overseas. He was in charge of all functions of the company, except administrative, accounting, legal, financial and personnel. He was particularly in charge of marketing of crude oil and petroleum products, which operations extended nationwide and in Europe and South America. He supervised the purchase of large amounts of crude petroleum. He served as Sinclair's president from 1957 to 1961, and was then elevated to chief executive officer, serving for 7 years until his retirement. He was not a geologist, petroleum engineer, or other technical expert, but had had considerable experience as an executive officer in his conduct of acquisitions of oil and gas properties, purchased either in stages of production, or only for exploratory operations. He had served as a director of Richfield Oil Corporation of California, and had familiarity with Richfield's

exploratory operations in the Santa Barbara Channel because of technical evaluations presented to the board.

(c) Mr. Steiniger was first contacted about testifying for plaintiffs in late December 1970, and his exposure to the problem was then only preliminary, but caused him to think generally about the matter before he came to Los Angeles. On Thursday, January 7, 1971, he arrived at Pauley's office, completed his evaluation by late Saturday night, and testified in this case on the following Tuesday, January 12, 1971. On January 7, 1971, he spent about 3 hours being introduced to Pauley personnel, talking briefly with each of them. Commencing the next morning and for 3 days from about 6:30 a.m. until after midnight, he conferred with various of Pauley's officers and employees: James B. Anderson, vice president of exploration, in a general discussion of the geology of the Santa Barbara Channel; James M. David, vice president of production and engineering, concerning Pauley's evaluations of tracts 375 and 384; Lawrence Scott, vice president of acquisitions, in broad aspects of the problem; George K. Peters on the development plans, capital costs, and operating expenses; Mr. Heck

in review of his post-exploratory geologic evaluations and interpretations; and Mr. Rakestraw on the resulting engineering and economic evaluations. He reviewed all of Mr. Heck's contour and isochore maps, and all of the documents prepared by Mr. Rakestraw on his economic and engineering evaluations. He also read the extensive testimony of Mr. Heck and Mr. Rakestraw. He testified that he accepted, not as a geologist, petroleum engineer or other technician, but as an oil company executive, that Pauley's geologic and engineering and economic evaluations had been credibly prepared, and accordingly he based his evaluations of market value on them.

(d) Mr. Steiniger took into consideration that there was a shortage of crude oil in the regional market available to subject tracts as well as elsewhere, and that the prevailing price of oil in 1969 at $2.92 per barrel would rise in the future, making California oil properties more valuable. He considered that the bid prices on subject tracts were high because of the wealth of geologic data on the Ventura Basin and the high production on the trend related to subject tracts, with the geologic and geophysical data indicating probable location of oil reserves in subject properties.

(e) Mr. Steiniger defined fair market value as the price a willing buyer would pay and a willing seller would take in accomplishing a sale of property, neither party being under force or compulsion. His evaluations of subject tracts were as of February 7, 1969.

(f) Mr. Steiniger used three methods of evaluating the tracts, and averaging the three results, concluded that the fair market values were $284,500,000 for tract 375 and $72,300,000 for tract 384, or $356,800,000 for both tracts.

(1) By his first method, which he called "Value determined on geological/engineering estimate of net recoverable oil and gas reserves," he valued the oil and gas reserves in place at $1 per barrel for oil and 10 cents per MCF for gas. These unit prices were matters of judgment on his part, what he normally expected as a profit on oil and gas over a period of years, not based on the market values at any given time, and not based on onshore or offshore production, but applicable to both, because he deemed the higher costs of offshore production offset by the necessity to have greater reserves and higher production

offshore than onshore. He applied his unit values to Mr. Rakestraw's figures of primary reserves of net oil and gas, with the exception that he reduced Mr. Rakestraw's figures of 702,000,000 MCF of net gas on tract 375 and 229,000,000 MCF of net gas on tract 384. The reductions of these net gas figures were made to exclude gas that would be used in production operations. The volumes of primary recovery reserves of net oil and gas used by Mr. Steiniger were: 361 million barrels of gas and 456,000,000 MCF of gas on tract 375; and 72 million barrels of oil and 149,000,000 MCF of gas on tract 384. Applying his unit oil and gas values to these volumes, Mr. Steiniger concluded that the fair market value of tracts 375 and 384 were respectively $406,600,000 and $86,900,000, or a total of $493,500,000 for both tracts.

(2) By his second method, which he called "Value determined on stabilized production from engineering production performance forecast," he concluded that tract 375 had a fair market value of $310,700,000 and tract 384, $46,100,000, or a total of $356,800,000 for both tracts. He used Mr. Rakestraw's figures on projected production, but only those

on primary recovery operations. He recognized that once in production, each well would have a declining rate of production over a substantial period of time, but that as to the overall production operations on each of the north and south structures, completion of the planned platforms and wells would require a period of 6 years, during which time daily production of oil would increase from zero production to the maximum daily production to be reached on each tract. Using Mr. Rakestraw's rates of production, Mr. Steiniger computed an average daily rate of production of oil and gas for each tract during the 6-year period. As to tract 375, including the south structure and its part of the north structure, such average daily rate of oil and gas production would be 58,500 barrels of oil and 36,400 MCF of gas. As to tract 384, covering only its part of the north structure, such average daily rate of oil and gas production would be 8,500 barrels of oil and 7,200 MCF of gas. Each of these average daily rates of production was multiplied by a dollar figure of $5,000 as to oil production, or by $500 as to gas production. The resulting products are Mr. Steiniger's conclusions as to the fair market value of the tracts. The $5,000 per barrel figure for oil

and the $500 per MCF figure for gas were values he placed on the primary recovery reserves, taking into consideration the total costs of production, and what the oil and gas would be worth if all reserves on each tract could be exploited in a single day. He testified that his use of the $5,000 figure was based on his previous experience in developing a scale ranging from $2,500 to $10,000 per barrel of oil per day to be applied on this theory of evaluation, and that he chose the intermediate figure in this case because the subject tracts did not have proven reserves and there were risks involved for that reason.

(3) By his third method, which he called "Value determined on the basis of 'matching' current total investment (compounded at 10% per year for three years) to acquire a 50% working interest," he concluded that tract 375 had a fair market value of $136 million and tract 384, $84 million, or a total of $220 million for both tracts. This was based on Mr. Steiniger's judgment as to what a willing buyer and a willing seller would agree was a reasonable price to acquire a 50 percent working interest in either or both of the tracts. He computed the total investment in tracts 375

and 384 to be respectively $68 million and $42 million, including the bonus paid, the costs of the exploration work already performed, and interest on the investment at 10 percent per annum compounded for 3 years. He then doubled the total investment figure for each tract, thus to include the matching figure the buyer would be willing to pay for a 50 percent interest, and thus arrived at the value of each tract on this theory.

66. (a) Generally stated, exploration for oil is a risky business as is recognized throughout the oil industry, and as indicated by current statistics that nationwide only one of the 13-15 exploratory wells accomplishes commercially significant production. Many exploratory wells are abandoned as not being commercially producible, and in this context, they are called dry holes. The eight exploratory wells on tracts 375 and 384 were in this sense dry holes, and were abandoned as such, even though presence of hydrocarbons was logged in various formations of seven of them, indicating the possibility of reservoirs in the tracts. As to the north structure, obviously the one exploratory well constitutes very limited drilling of a large area; and as

to the south structure, the seven wells (plus the redrill) is rather substantial exploration, providing data as to the nature, dips and contours of the formations, and indications of the presence of hydrocarbons, but substantial areas of that structure remain to be probed. Despite the contrary emphasis by opposing witnesses in characterizing the nature of the purpose of the drilling of the exploratory wells, one must reasonably conclude that they were drilled with the primary purpose of penetrating assumed reservoirs. Of course, an exploratory well may be drilled for the purpose of securing additional geologic and engineering data on the tract, and sometimes for defining the limits of proven oil reserves for the purposes of proper location of platforms and producing wells. The generally low rate of success in exploratory drilling is not necessarily applicable to an area like the Ventura Basin, because extensive geologic and engineering data had been developed in the thorough exploration and development of that highly productive area. Nevertheless there are hazards in applying such data to tracts on which there has been limited exploratory drilling. It is clear that the geologic formations in subject tracts are complex, due

in part to extensive faulting. There are substantial risks as to the accuracy of seismic interpretations used to prepare contour maps of the formations. This is particularly true with respect to formations at depths below 6,000 feet, because at the greater depths there is a compounding of the difficulty of distinguishing between primary reflections and the multiple and other unreliable recordings on the geophones or receivers used in seismic surveying. In areas not penetrated by exploratory wells, there could be erroneous assumptions of the existence of trapping mechanisms, based on seismic misinterpretations, as well as on geologic misinterpretations.

(b) Because of the extensive seismic, geologic and engineering data accumulated by Pauley, and the very favorable interpretations made thereof, plaintiffs made high bids on subject tracts, and were highly optimistic about success during the early stages of the exploratory drilling, even contemplating erection of platforms, but the results of the drilling caused several of them to become disappointed and pessimistic, as revealed by reports to management and stockholders prepared in the ordinary course of business, and by reports of meetings of the operating committee of the joint venturers.

(c) As previously stated in connection with the detailing of the interests of the various plaintiffs in the two tracts, TransOcean and Kewanee each held a 10 percent interest in both tract 375 and tract 384. They held such interests during most of the exploratory drilling operations and at the cessation in late January 1969, and for a short time thereafter. Both of them had invested several million dollars in each tract, covering their contributions to the bonus payments and to the costs of exploration. On March 21, 1969, TransOcean sold both of its 10 percent interests to various of the plaintiffs for $50,000 for each tract, holding no interest in either tract thereafter. On October 31, 1969, Kewanee sold its 10 percent interest in tract 375 to various of the plaintiffs for $25,000, terminating its interest in that tract, but retaining its 10 percent interest in tract 384.

(d) With respect to each of the exploratory wells drilled, except Well No. 5, the drilling program approved by the operating committee contemplated casing of the well for production test if the conditions encountered warranted. In connection with its application for a permit to drill Well No. 5, Pauley

requested a variance with respect to a requirement that certain casing be used, stating the reason to be that savings would be realized, and that without such savings additional holes could not be justified to management, because to date the lessees had been unsuccessful in discovering commercial oil sand. In none of the exploratory wells was a production test accomplished with or without casing. A bore hold production test was attempted in one of the wells, without the use of casing, but failed because enlargement of the bore hole caused the equipment to be ineffective. It must be concluded that the abandonment of all of the exploratory wells as not commercially producible had to be discouraging to the plaintiffs.

(e) Kewanee's disappointment with the results of the exploratory drilling on tract 375 was expressed to Pauley by letter, dated December 26, 1968. Mention was made of Wells No. 1, 3, 4 and 5, the drilling of which had been accomplished on tract 375 prior to mid-Spetember 1968, and to Wells No. 6 and 7, the drilling of which occurred in succession during the period from November 27, 1968, to January 24, 1969. Kewanee was responding to

Pauley's request for comments on its proposal for drilling Well No. 8 on tract 375, and stated that if Wells No. 6 or 7 encountered commercially significant shows of oil, then Well No. 8 should be drilled to develop an oil accumulation that would supplement that which it was hoped would be found in Wells No. 6 and 7, but that in the absence of sufficient encouragement from such wells, Kewanee would not be in favor of further drilling on tract 375.

(f) On December 27, 1968, when Well No. 6 was nearing its total depth drilled, Pauley polled the lessees pursuant to the previous request of TransOcean that casing be set in the well for a production test of the interval between 5,160 and 5,500 feet and all comparable or better zones. Pauley advised that Union and Gulf, who as lessees of the adjoining tract were contributing 50 percent of the drilling costs, were not interested in a test, and that the estimated cost of the testing would be $119,000 chargeable pro rata to the lessees of tract 375. TransOcean, Colorado and Huber, with voting power of 37.84 percent, voted for the testing, with negative votes totaling 55.66 percent from

other lessees, and with Mesa and Macdonald abstaining. Kewanee voted negatively. The three affirmative voters could have had the test run by assuming all of its costs, but this was not done, and accordingly Pauley abandoned Well No. 6 and moved on to the drilling of Well No. 7.

(g) While the drilling of Well No. 7 was in progress, Pauley on January 9, 1969, made a telegram poll of the lessees for their votes on its proposal for the drilling of Well No. 8, to be located about 2/3 mile north of Well No. 6, just inside of the boundary of tract 375. Pauley stated the condition that one-half of the costs of the proposed well would be paid by Union and Gulf, the lessees of the adjoining tract. Both Kewanee and Husky replied that their votes would be "no" in the absence of significant shows in Well No. 7. Colorado, Mesa, Huber and Macdonald voted affirmatively; and Ashland negatively. Trans-Ocean voted "yes" qualified on the outcome of the present drilling on the tract. On January 17, 1969, Pauley advised the lessees by telegram that there were no significant shows in Well No. 7, that the final logs would be run and that well plugged and abandoned, and that the Wodeco I drilling vessel would be released

and would be unavailable for the drilling of proposed Well No. 8, unless the proposal for Well No. 8 was approved by all lessees. Kewanee and Husky then voted "no." TransOcean then voted "yes." Midwest did not vote. On January 20, 1969, Pauley advised the lessees that the negative votes were 35.546 percent of the total interests, and that the drilling vessel would be released upon the accomplishment of the logging and plugging of Well No. 7, which was done.

(h) The minutes of the meeting of the Operating Committee held on January 23, 1969, show that Ashland stated that it had written off both tracts and offered its interests to the group, stating that the acquiring party would be obligated to pay Ashland's share of cost of future work. Negotiations began between Ashland, Forest and McCulloch for Ashland's interest in tract 384. Discussions were held in review of past activities on tract 375, and concerning further drilling on that tract. Locations were discussed, but voting produced no single approved site. It was noted that an engineering study would be made of remaining potential reserve areas on tract 375, and that another meeting would be

called for the final recommendation regarding that tract. The group authorized the release of the Wodeco I drilling vessel. At this meeting, the committee approved Pauley's proposal for the drilling of Well No. 2 on tract 384.

(i) Considerable testimony was offered by plaintiffs in this case to explain that tax benefits and other considerations were the basis for the cheap sales of the interests of TransOcean and Kewanee in subject tracts, in the face of the heavy investments which they had made, and also why Ashland wrote off its large investments, but it is concluded that such parties had lost their enthusiasm about the success of the exploratory operations, and did not share the optimistically high values of subject tracts as potential reservoir areas as presented by the original plaintiffs in the trial of this case. The failure of the involuntary plaintiffs actively to participate in the trial of this case also bears heavily upon these considerations.

67. Substantial differences exist between the opposing expert witnesses in this case regarding the interpretation of the seismic

data on subject tracts, and also the interpretation of the mud logs and electric logs prepared in the drilling of the exploratory wells on and near subject tracts. It is extremely difficult to reconcile these differences, because of the understandable difficulty on the part of the expert witnesses to justify their largely subjective reasoning, with inferences based on inferences to a complex degree. It is of no help that computerized data was supplied, because the programming of (input to) the computer is not sufficiently explained, and the validity of the computerized data is thus not established. The varying interpretations result in wide differences in the mapping of trapping mechanisms in various formations, and also in the computation of amounts of net sands or other porous and permeable material within assumed reservoir locations. As to the net sand counts set forth in preceding findings concerning the eight exploratory wells drilled on subject tracts, these figures are those arrived at by Mr. Heck with the aid of plaintiffs' consulting well log analyst. They differ substantially from the interpretations made by defendant. These problems also exist with respect to determination of reservoir parameters for the opposing petroleum engineers.

68. (a) In the preparation of defendant's geologic and engineering and economic evaluation of subject tracts, geophysicists prepared structural contour maps. Defendant's principal witness on this mapping was Lowell Gene Hammons, Staff Geophysicist, Branch of Mineral Classification, Conservation Division. U. S. Geological Survey. He prepared the maps with the aid of two geophysicists on his staff, both of whom had had considerable experience on the Ventura Basin and other oil producing areas of Southern California. In accomplishing the project, he conferred with defendant's geologists.

(b) Mr. Hammons graduated from Southwestern State University, Oklahoma, in 1954 with a B.S. degree in mathematics, and a minor in physics. Thereafter, during military and civilian service for defendant, he took courses in geologic oceanography, acoustical properties of transmission of sound in water, and acoustical data interpretation. From 1954 to 1958, he was employed by Western Geophysical Company; from 1958 to 1960 by the U. S. Naval Oceanographic Office; from 1962 to 1965 by the U. S. Geological Survey in Louisiana; from 1965 to 1968 by the U.S. Naval Oceanographic

Office; and commenced his present position with the Geological Survey on December 1, 1968. His training and experience qualify him as an expert in exploration geophysics and seismic interpretation.

(c) After initial studies of seismic data which had been accumulated by Continental Oil, Standard Oil and the Union Pacific Railroad, Mr. Hammons learned that Pauley had extensive seismic data from three sparker-type surveys and from one of the air-gun type (herein called the Digicon data) which Pauley had had conducted over the subject tracts. Pauley furnished all of such data to Mr. Hammons in February 1970, and Mr. Hammons completed his seismic interpretation and his geophysical structural maps in October 1970, when he furnished them for use by Keith Yenne, defendant's chief geologist in this case.

(d) Mr. Hammons reviewed all of the data furnished by Pauley, both the sparker-type and the Digicon, and concluded that the Digicon data had the best quality and in his judgment was more reliable than the other data.

(e) He then used a map in evidence, which graphically sets forth the locations of the seis lines run in the Digicon survey of subject tracts. These lines completely cover the tracts in a grid pattern, with seven north-south lines, and with nine east-west lines. In accordance with the frequency of energy emissions in the survey, many shot points are shown spaced along each sies line, and there are numerous such shot points scattered throughout both tracts on the seis lines.

(f) Each of the pertinent migrated sections is in evidence, covering that part of each seis line located within the area of subject tracts. Each is a cross section drawing along a particular seis line, prepared by the company which conducted the survey, showing by a maze of markings the seismic interpretation of the recordings received. These markings are called reflectors, and each is placed on the migrated section at the depth from which the primary reflection came. Each migrated section sets forth the successive shot points, and thus any reflector's location is determined in relation to a particular shot point.

(g) Mr. Hammons prepared four structural contour maps, each covering one of four geologic formations within subject tracts, i.e., the tops of the Middle Pico, Lower Pico, Upper Repetto, and Miocene. With respect to various exploratory wells drilled on or near subject tracts, Pauley's geologists supplied Mr. Hammons with the depths in each well at which each such formation was encountered. For example, on Well No. 1 on tract 384, the tops of such formations were furnished to him as 2,409 feet for the Middle Pico, 7,238 feet for the Lower Pico, 9,063 feet for the Upper Repetto, and 13,865 feet for the Miocene, although this latter depth was estimated, because the well had a total depth of 13,122 feet.

(h) Mr. Hammons used these tops in the wells as his starting points in determining the structural contours of the formations. For example, with respect to the Middle Pico in Well No. 1 on tract 384, he took the seis line nearest to that well, and found the shot point nearest to the well on the pertinent migrated section. At the depth of 2,409 feet at that shot point location, he observed the reflector which in his judgment represented a

primary reflection from what he assumed to be the top of the Middle Pico formation. He then traced the reflectors from that point along the pertinent migrated section within subject tracts, selecting those reflectors which by his interpretation defined the contour of the Middle Pico along that seis line. He repeated this procedure with respect to each well with a designated top of the Middle Pico. Of course, all of the seis lines did not have a correlation with nearby well locations. To solve this problem, and to select reflectors at all shot point locations, he used a procedure known as looping, tying established relfectors to all other reflectors over the area being mapped. The looping process required him to change some of the reflectors which he had previously selected. He prepared his Middle Pico map on the basis of the reflectors which he selected as representing primary reflections from the top of that formation in subject tracts. He used this same overall procedure in preparing his maps of the tops of the Lower Pico, Upper Repetto, and Miocene. He called his maps "phantom" horizons because in his procedure of selection of successive reflectors, he had to draw a line between them. The variance in depths of the reflectors determined the contours of the horizon throughout the area of seismic interpretation.

(i) Mr. Hammons' structural map "near" the top of the Middle Pico shows an anticlinal north structure extending east-west through tract 384 and the northern part of tract 375. It is bounded on the north by the east-west extension of the Oakridge fault, located in the north part of tract 384, and on the south by the east-west extension of the McGrath fault through the middle of the north half of tract 375. The latter fault is along the synclinal axis between the north and south structures depicted. The south structure extends east-west through the central and most of the southern portion of tract 375, and is bounded on the south by the Montalvo trend fault. The north structure is bounded on the west by a cross fault at and near the west boundary of tract 384, but Mr. Hammons' interpretation was that there was no displacement of the Middle Pico formation along this fault, and his contour lines cross this fault without changes in depths.

(1) The crest of the north structure on the Middle Pico is located in the west half, where the contour lines are drawn at depths of 2,300 and 2,400 feet, with the contour lines dropping from the crestal

area at 100-foot intervals, progressing down the entire north flank from 2,500 to 5,000 feet to the Oakridge fault, and down the south flank, from 2,500 to 4,000 feet to the McGrath fault. As provided by defendant's geologists, various exploratory wells and core holes are located, and the indicated tops of the Middle Pico are stated as follows: In or near the crest of the north structure, a Union well on tract 384 at 2,387 feet, and Pauley's Well No. 1 on tract 384 at 2,409 feet; located on the north flank, a Signal well on tract 384 at 2,459 feet, and a Continental well on tract 385 (very close to tract 384) at 2,676 feet; and located on the south flank, a Mobil well on tract 385 (close to tract 384) at 2,593 feet, and a Union well on tract 384 at 2,763 feet. These well depths correlate with the nearby contour lines. On the north flank of the north structure, there is a fault extending east-west along the 2,500-foot contour line, from the east boundary of tract 384 almost to its west boundary, called the Hinge Line fault.

(2) The south structure on the Middle Pico has a crestal fault extending east-

west throughout all of tract 375, dividing the south structure into different geologic formations, although the south structure is basically anticlinal in its entirety. North of the crestal fault, the contour lines drop from 1,500 feet at the Crestal fault to 4,000 feet at the McGrath fault. the referenced wells on the north flank, and the depths of the tops of the Middle Pico are as follows: Pauley's No. 2 well on tract 375 at 1,506 feet, Pauley's No. 7 well at 2,011 feet, and Mobil's well on tract 376 (very clost to tract 375) at 3,817 feet. The part of the south structure south of the Crestal fault has a domelike anticlinal structure in its western half, with the crest toward the western boundary, with the crest at 1,400 feet, and with concentric contour lines to 1,700 feet. From this domelike area, the south flank dips toward the south, with the contour lines down to 2,000 feet, swinging into the Crestal fault toward the east, and with the rest of the contour lines dropping to the south to 4,000 feet at the Montalvo trend fault. The referenced wells south of the Crestal fault, and the indicated tops of the Middle Pico, are as follows:

All being Pauley's wells on tract 375, Well No. 1 at 1,765 feet, Well No. 4 at 3,217, Well No. 3 at 3,330 feet, and Well No. 5 at 3,815 feet. The wells referenced for the south structure (both north and south of the Crestal fault) correlate with the contour lines near them.

(j) Mr. Hammons' structural map "near" the top of the Lower Pico is basically similar to his map on the Middle Pico, showing the same east-west trending of both the north and south structures as anticlines, and the same faults for both tracts. However, there is some migration of the structures to the south. Mr. Hammons' interpretation of the West Boundary fault of the north structure was the same as on his Middle Pico map, that there was no displacement of the formation along that fault.

(1) The crestal area of the north structure on the Lower Pico was shown as being in the central area of the west half, with contour lines from 5,300 to 5,500 feet. In and near this area, two of the three wells used on the Middle Pico map are located, with the designated tops

of Lower Pico as follows: Union well on tract 384 at 5,314 feet, and Mobil well on tract 385 (close to tract 384) at 5,274 feet. From the crestal area, the contour lines drop on the north flank at 500-foot intervals from 6,000 to 10,500 feet to the Oakridge fault, and on the south flank from 6,000 to 7,500 feet to the McGrath fault. On the south flank, there is no reference well located; and on the north flank, one well is located, Pauley's No. 1 on tract 384, with the indicated top of the Lower Pico at 7,238 feet. The well depths correlate with the contour lines.

(2) On the south structure, the contour lines on the north flank drop at 500-foot intervals from the Crestal fault from 3,500 to 6,000 feet at the McGrath fault, and on the south flank from 3,500 feet in the crestal area located at and near the western boundary of tract 375, progressively to the east, to 5,000 feet near the eastern boundary. The south flank has a geologic unconformity drawn which indicates that a substantial area along the entire lower south flank is

indicated as not having the Lower Pico formation, which area Mr. Hammons designated by drawing a line across the south flank from east to west, which he marked as the approximate limit of the Lower Pico. On the north flank, Pauley Well No. 7 is noted as having a top of the Lower Pico at 4,697 feet, Pauley Well No. 2 at 3,620 feet, with the latter depth conforming with depths indicated for several nearby core holes. On the south flank, the tops are indicated as 3,858 feet in Pauley Well No. 1, and 3,468 feet in Pauley Well No. 6. The well depths correlate with the contour lines.

(k) Mr. Hammons' structural map "near" the top of the Upper Repetto is basically similar to his maps on the two formations above, showing the same east-west trending of both the north and south structures as anticlines, with the same faults for both tracts, and with further migration of the structures to the south. He again shows no displacement of the formation along the West Boundary fault of the north structure.

(1) The crestal area of the north structure on the Upper Repetto is drawn as

a large area commencing in the northeast corner of tract 375, proceeding northwesterly from that tract through and somewhat beyond tract 384. The contour lines in the crestal area are 6,300 to 6,500 feet, and then at 500-foot intervals down the north flank to 12,000 feet to the Oakridge fault, and down the south flank to 8,000 feet to the McGrath fault. One well indicated near the crestal area is the Mobil well on tract 385 (close to tract 384) with the top of the Repetto at 6,393 feet. The one well located on the north flank is Pauley Well No. 1 on tract 384 with the top of the Upper Repetto a 9,063 feet. There is no well indicated as located on the south flank. The well depths correlate with the contour lines.

(2) On the south structure, the contour lines on the north flank drop at 500-foot intervals from the Crestal fault from 4,000 to 7,500 feet to the McGrath fault, and on the south flank, from the crestal area in the western part of the south flank at 4,000 feet, progressing in depth easterly, to 5,000 feet at the east boundary of tract 375. On the north

flank, the located wells and the designated tops of the Upper Repetto are as follows: Pauley Well No. 2 at 4,390 feet, with closely similar depths on two nearby core holes, Pauley Well No. 2 redrill at 5,113 feet, and Pauley Well No. 7 at 5,419 feet. On the south flank, the referenced wells are all Pauley wells, being Well No. 6 at 3,633 feet, Well No. 1 at 4,371 feet, Well No. 3 at 4,315 feet, and Well No. 4 at 4,145 feet. The well depths correlate with the contour lines.

(1) Mr. Hammons' structural map "near" the top of the Miocene presents a radically different structure at this depth from the higher formations mapped by him, at least as to the north structure and to a substantial degree as to the south structure.

(1) On the north structure, the top of the Miocene is shown to be a nearly horizontal formation, rising gradually and steadily from its extreme depth of 16,500 feet at the Oakridge fault, the north boundary, to 10,500 feet at the McGrath fault, the south boundary. The intervening contour lines are evenly

spaced, at 500-foot intervals of depth, indicating that the whole north structure rises at a low angle from north to south. The West Boundary fault on the north structure shows substantial displacement, i.e., that the top of the Miocene is higher west of that fault. The only well located in relation to the fault is the Mobil well on tract 385 (close to tract 384) with the top of the Miocene indicated at 9,227 feet. This well does not correlate with the contour lines on the north structure on tract 384, because of the substantial displacement at the West Boundary fault.

(2) At the McGrath fault, marking the boundary between the north and south structures, substantial displacement is shown on the Miocene formation. On the north side of that fault, the top of the Miocene has risen to a depth between 10,500 and 11,000 feet whereas on the south side, the Miocene top commences at a depth between 9,000 and 9,500 feet, and then rises at a somewhat increased angle to 4,500 feet at the Crestal fault of the south structure. South of the Crestal

fault, the crestal area is near the west boundary of tract 375 at 4,500 feet, with the dip of the formation to the east between the Crestal fault and the Montalvo trend fault (south boundary of south flank) to a depth of 6,000 feet at the east boundary of tract 375. On the north flank, Pauley Well No. 2 has an indicated top of the Miocene at 6,026 feet. On the south flank, Pauley Wells No. 1, 3, 4 and 6 have indicated tops respectively of 4,648, 4,830, 4,537 and 4,301 feet. These well depths correlate with the contour lines.

(m) Upon review of the seismic data from Pauley's three sparker-type surveys and the Digicon survey, Mr. Hammons concluded that there was a paucity of data concerning any formation below the Miocene on subject tracts, that the little information available indicated that lower formations would be conformable to the Miocene, but that such information was insufficient for a seismic interpretation, and he prepared no structural map on any formation below the Miocene.

69. (a) Mr. Keith Yenne, Staff Geologist, and at times Acting Regional Geologist, Pacific Coast Region, Branch of Mineral Classification, U. S. Geological Survey, was defendant's principal witness on the geologic interpretation and evaluation of subject tracts. He was assisted in his interpretations by David Griggs, another petroleum geologist on the same staff, and they worked together extensively on the project. Rogers Pearcy, Senior Staff Engineer, Gulf Coast Region, aided Mr. Yenne in making sand counts by use of the induction electric logs of the wells.

(b) Mr. Yenne graduated from the University of Nebraska in 1937 with an A.B. degree in geology, received an M.S. degree in geology from Washington University in St. Louis in 1939, and an M.A. degree in geology with special emphasis in paleontology from Harvard University in 1947. From 1939 to 1942, he was employed by Shell Oil Company, service as a subsurface geologist in the Illinois Basin, sitting on wells, studying cuttings, preparing logs and plotting geologic data on subsurface geologic maps. After 3 years of service in the Navy, he attended Harvard University, and from 1947 to 1949 worked for a subsidiary of Standard

Oil Company in Colombia as a paleontologist determining the age of rock specimens for the field geologist. From 1949 to 1952, he was employed by the U.S. Geological Survey, serving as a geologist measuring sections along the edge of the Wind River Basin in Wyoming, and correlating them with well information from the center of the basin; and then was transferred by that agency to Austin, Texas, where he served as a paleontologist making a study of the prolific oil-producing reefs in West Texas. From 1949 to 1962, he served as a petroleum geologist for DeGolyer and MacNaughton, serving 2 years in Brazil as a member of a team of three geologists and a petroleum engineer, supervising as consultants to the Brazilian government, an extensive exploration program for oil, involving all field mapping, geophysical mapping, and exploratory drilling. He was then transferred by DeGolyer to Uruguay, where he supervised the geologic part of that country's similar exploration program. For the next 2 years, he spent most of his time with DeGolyer in Spain on a joint venture between the Spanish government and American companies, where as a member of a team of eight geologists, geophysicists and petroleum engineers, he engaged

principally in field mapping and sitting on wells. He was then returned to Dallas, Texas, where for DeGolyer he engaged in special studies for various clients, doing research to locate prospective exploration areas in Libya, Algeria and the Persian Gulf. Upon his return to the U.S. Geological Survey in 1962, he served 2 years at Denver, Colorado, as a geologic map editor for publication of geologic maps and related text material, and then was transferred to the staff of the Mineral Classification Branch at Washington, D. C., where he wrote and reviewed reports from the field concerning oil and gas on public lands. He commenced his present duties with the U.S. Geological Survey in mid-1967, when he was assigned to geologic evaluation of OCS tracts in the Santa Barbara Channel, which work he continued until he testified in this case in February 1971.

(c) For their geologic interpretation and evaluation of subject tracts, Mr. Yenne and Mr. Griggs had available and reviewed all of the data accumulated by Pauley on the drilling of the eight exploratory wells on the tracts, including the mud and electric logs, the migrated sections and related seismic information, and the paleontologic reports on the

wells. The paleontologic reports indicated for each well by zones the levels of depth and thicknesses of the successively deeper formations drilled or penetrated. They also used like data from the core holes on and near subject tracts, and from the Mobil No. 1 well on tract 385, and from the Texaco No. 1 well on the tract immediately north of tract 385 and northwest of tract 384.

(d) In general, defendant's team of geophysicists, geologists and petroleum engineer were all working together, and each part of the project proceeded with the others. However, the first step in the overall procedure was to plot the paleontologic zones on the induction electric log for each well, and then correlate such zones from well to well. Using the tops of formations at well locations, the geophysicists prepared their geophysical contour maps. Considering such maps, and using all available geologic data, the geologists prepared their structure maps, and in the process redrafted them to conform with dipmeter data and formation thicknesses projected from the wells.

(e) Mr. Yenne also prepared a cross section map of subject tracts, which was also used in preparing the final drafts of the geologic contour maps, furnishing a guide from the projection of the formation thicknesses in the wells along the cross section to correlate with such matters in the other wells. Such cross section was along a line which crossed both the south and north structures, commencing at a point south of the Montalvo Trend fault, proceeding northeasterly through the site locations of Wells No. 3, 1 and 2 on tract 375, and then directly north to Well No. 1 on tract 384, and then north-northeasterly to the Oakridge fault. In depth, the cross section map shows along that line the successively deeper formations from the Middle Pico to the Sespe, the relative locations of the four wells and the extent to which they drilled or penetrated the formations, and also the relative locations of the major faults, the Montalvo Trend, the Crestal, the McGrath, and the Oakridge, from south to north. The Middle Pico formation is shown to be anticlinal on both the north and south structures. The Lower Pico, Upper Repetto, and Lower Repetto are shown as broadly anticlinal in the north structure with their crests migrating successively to the

south, with sharp dip of each formation to the north to the Oakridge fault, and minor dip to the south to the synclinal McGrath fault. In the south structure, the latter three formations updip from the McGrath to the Crestal fault. South of the latter fault, the Lower Pico is displaced downward, dips to the south, and pinches out halfway to the Montalvo Trend fault; the Upper Repetto does not exist; and the Lower Repetto is also displaced downward, and extends horizontally to the Montalvo Trend fault. All of the successively deeper formations, the Upper Miocene, Monterey, Monterey "Solid," Rincon, Vacqueros, and Sespe, are shown to have their greatest depths at or toward the Oakridge fault, updipping rather steeply to the south to the McGrath fault, where with displacement upward they continue their updips to the Crestal fault, where with displacement downward, they continue their updips to the Montalvo Trend fault, where with displacement downward, they continue their updips to the south end of the cross section.

(f) Mr. Yenne prepared geologic structure contour maps on the same formations covered by the geophysical maps, the Middle

Pico, the Lower Pico, the Upper Repetto, and the Miocene. In addition, Mr. Yenne made a geologic map on the Monterey, with no geophysical map on that formation. The geologic maps show generally the same shapes or contour forms of the various formations as drawn on the geophysical maps. The major differences are that dips of some of the formations on Mr. Yenne's maps are at different angles than on the geophysical maps. Mr. Yenne concluded that the dipmeter readings in the wells were more reliable than the seismic data, and he used the dipmeter data rather than the seismic to the extent to which they conflicted. However, the contour lines are the same on both sets of maps at locations controlled by the paleontologic tops of the formations in the wells, with the differences in contour lines being at locations where there was no direct well control.

(1) The geologic structure contour map on zone 27 of the Middle Pico is obviously so similar to the corresponding geophysical map that the previous description of the latter is adopted as applicable. The same faults are shown on both maps, with the exception that Yenne's map does

not show the Hinge Line fault along the contour line at 2,500 feet on the north flank of the north structure. Yenne rejected this fault as not being established by the seismic data, concluding that from the geologic data, there was a displacement differ.

(2) The geologic structure map on zone 42 of the Lower Pico is also quite similar to the corresponding geophysical map, with differences to be noted. On the north structure, the crestal area of the anticline is circumscribed by contour lines at depths of 5,300 and 5,400 feet, instead of 5,300 to 5,500 feet, and on the north flank, the contour lines down the entire flank extend to a depth of 12,500 feet, rather than 10,500 feet. On the south flank of the north structure, the contour lines extend to a depth of 6,500 feet, rather than 7,500 feet. On the south structure, the contour lines on the north flank drop from 3,000 to 6,000 feet, rather than from 3,500 to 6,000 feet, and on the south flank from 3,000 to 5,000 feet, rather than from 3,500 to 5,000 feet. The Hinge Line fault is shown on

the geophysical map on the north flank along contour lines 6,000 and 7,000 feet, but not the geologic map. The faults are otherwise the same, with differences as to the amounts of displacement. As to the Boundary Line fault on the north structure, the geophysical map does not show displacement, but the geologic map does, with displacement upwards west of that fault.

(3) The geologic structure map on the top of the Repetto is also quite similar to the geophysical map on that formation, but again with differences. On the north structure, the crestal area of the anticline has contour lines at 6,400 and 6,500 feet, rather than from 6,300 to 6,500 feet, and the contour lines on the north flank extend to 15,000 feet, instead of 12,000 feet, and the contour lines on the south flank drop to about 7,500 feet, rather than to 8,000 feet. On the south structure, the contour lines on the north flank drop from 3,500 to 7,000 feet, instead of 4,000 to 7,500 feet, and the contour lines on the south flank are from 3,600 to 5,500 feet, rather than from

4,000 to 5,000 feet. The Hinge Line fault is again shown on the geophysical, but not on the geologic map. The faults are otherwise the same, with the Boundary Line fault showing displacement on the geologic, but not on the geophysical map, and with displacements on the other faults differing in amount.

(4) The geologic structure map on the top of the Miocene again has the same shapes of the formation, with differences in the depths of the contour lines. On the north structure, the formation is again shown to be a geologic terrace, not an anticline, gradually sloping, though more steeply than on the geophysical map, from 9,300 feet from the McGrath fault to maximum depth of 21,000 feet at the Oakridge fault, rather than from 10,500 to 16,500 feet. On the south structure, the contour lines on the north flank of the anticline are the same on both maps, from 4,500 to 9,000 feet, and on the south flank extending from west to east, from 4,400 to 7,000 feet on the geologic map, rather than from 4,500 to 6,000 feet. The geologic map shows all of

the faults on the geophsyical, with neither showing the so-called Hinge Line fault. The Boundary Line fault and the other faults show displacement of the formations, with differences between the two maps as to amount.

(5) Mr. Yenne's geologic structure map on the top of the Monterey covers only the south structure. He had no well control for the Monterey underlying the north structure, since the only well in that area, Pauley's Well No. 1 on tract 384, did not penetrate the Monterey, whereas on the south structure, his well controls were Pauley's Wells No. 1, 3, 4 and 6, with the paleontologic tops of the Monterey formation respectively at 6,368, 6,518, 6,313, and 5,129 feet. The high point of the Monterey is 5,129 feet at the location of Well No. 6 at the Crestal fault near the west boundary of tract 375. The general slope of the entire north flank is from 5,500 at the Crestal fault to 11,000 feet at the McGrath fault. The general slope of the south flank is from a contour elevation of 5,500 feet near Well No. 6 easterly to 9,000 feet at the east boundary of tract 375.

(6) Mr. Yenne prepared no structure maps on formations below the Miocene on the north structure and below the Monterey on the south structure, because he concluded that there was neither seismic nor geologic evidence to define structures at such depths.

(g) Mr. Yenne prepared two maps, each entitled "Net Possible Oil Sand Map," which showed locations where his geologic interpretation was that there were potential or possible reservoir accumulations of oil and gas. One map is on the Middle Pico, showing an area of accumulation on each of the north and south structures. The other map is on the Repetto, showing a reservoir on the north structure. He mapped no other reservoir locations on subject tracts.

(1) On the north structure of the Middle Pico, the reservoir area was located in the crestal area of the anticlinal structure drawn on defendant's geologic structure map. It is entirely within tract 384, roughly occupying the west half of the middle 1/3 of the tract, extending west-northwesterly, starting a short

distance west of the site of Well No. 1 on tract 384, and terminating at its broadest expanse at the West Boundary Line fault. Signal core hole CHI-4 is near the reservoir on the north, and Union core hole SB-14 on the south, both serving to limit the reservoir area to the north and south, because they were dry holes drilled through the Middle Pico. The reservoir area averages roughly one mile wide and about 2 miles long. It is a domelike structure, truncated at its west end by the fault. From its crestal area which extends to the fault, and starting from the fault on the north slope, there is a series of five sandcount lines, each extending along the north, east and south slopes, and returning to the fault on the south slope. In succession from the crest to the zero perimeter line of the reservoir, the sand count lines are labeled 500, 400, 300, 200 and 100 feet, all around the reservoir from the fault.

(2) On the south structure of the Middle Pico, the reservoir was located in the lower half of the south flank of

the south structure, where the contour lines on the geologic map are from about 1,700 to 3,500 feet. The south boundary of the reservoir is along the Montalvo Trend fault, which trends west-northwest, and the east boundary is a south-north line from the Montalvo Trend fault, closely including the site of Well No. 1 on tract 375, and then proceeding east-west (for the north boundary) back to the Montalvo Trend fault. The reservoir area is roughly 1 1/2 miles long and 1/2 mile wide. Well No. 3 on tract 375 is located near the Montalvo Trend fault in the eastern half of the reservoir area. Mr. Yenne concluded from the well data that there were 140 feet of net oil sands in the reservoir at the site of that well, and that there were 10 feet of oil sands at the site of Well No. 1. From the site of Well No. 3, he considered that the net oil sands would decrease from 140 feet gradually throughout the reservoir to its perimeter, and accordingly he drew a series of sand count lines marked at intervals of 20 feet from the 140-foot line near Well No. 3 to the zero line at the boundary. Mr. Yenne actually drew the

east boundary of the reservoir halfway between Well No. 3 and Well No. 4 to the east, and also the west end of the north boundary of the reservoir halfway between Well No. 3 and Well No. 6 to the northwest. Both Well No. 4 and Well No. 6 had no net oil sands, and he considered that the oil sand area would terminate at points halfway between Well No. 3 and those other two wells. Of course, the low count of net oil sands determined the boundary line just beyond Well No. 1. Mr. Yenne counted only the net oil sands in this reservoir, and did not use the method employed on his other two reservoirs, i.e., counting all net sands, and then using a factor of 25 or 50 percent to determine net oil sands.

(3) On the north structure of the Repetto, Mr. Yenne's potential or possible reservoir was located in the crest of the anticlinal structure, in the area between the 7,000-foot contour lines on the north and south flanks. It lies in both tracts 384 and 375, with the somewhat larger part in tract 384. It extends from the west boundary of tract 375 west-north-

west to the Boundary Line fault in tract 384, near the west boundary of the latter tract. It is almost 3 miles long and averages about one mile wide, increasing from a somewhat narrower width to a greater width from east to west. It is south-southwest of Well No. 1 on tract 384. It shows a sand count contour line of 200 feet in the central area of the reservoir, decreasing to a 100-foot line and then to the zero line at the perimeter of the reservoir.

(h) Mr. Yenne did not map any other potential reservoir areas on his geologic maps for various reasons. In areas where the wells had minor indications of hydrocarbons either high or low on an anticlinal flank, he declined to assume that hydrocarbon accumulations existed either downflank or upflank, stating that the only way to locate a stratigraphic trap of hydrocarbons is to drill into it. He stated that it was not standard geologic practice to assume the existence of statigraphic traps. He concluded that the Lower Pico formation had very few or no shows of hydrocarbons in the wells, and that sand development was not good, being thin and dirty. His

appraisal of the Miocene formation was that the rock formations were primarily siltstone, claystone, and diatomaceous shale, with porosity and permeability too low for reservoir rock. As to the Monterey formation, he stated that the rock formations were siliceous shale, cherts and carbonates, without effective porosity or permeability, without extensive fracturing, and that the evidence of fracturing was insufficient to assume that any reservoir existed. He recognized that wells were producing from fractured Monterey in the Santa Maria Valley, about 50 miles from subject tracts, but that oil production operations there demonstrated that the fracturing was erratic, with some exploratory wells being dry holes, although drilled near wells producing from the Monterey.

(i) As part of the work of Mr. Griggs in aid of Mr. Yenne's geologic interpretation of subject tracts, Mr. Griggs made studies of the Miocene and Monterey formations in various areas of Southern California, with emphasis on the Ventura Basin as to the Miocene and on the Santa Maria Valley as to the Monterey. As a petroleum geologist, he had had extensive training and experience in stratigraphic analysis, well log analysis, and lithologic

studies. He disagreed with the conclusion of Mr. Heck and Pauley's consulting well log analyst that the Miocene in subject tracts was an alternating sequence of sands and shales. He concluded that such formation was predominantly finely grained diatomaceous mudstones and claystones, with the grains 10 to 15 times finer than the finest sands, with very low porosity and permeability, with no significant sands in the formation. In reaching his conclusions, he considered literature on the Miocene in Southern California, including the Ventura Basin, and reviewed extensively the mud logs and electric logs from the exploratory wells on subject tracts. He also inspected the residual sidewall samples taken from the Miocene in the wells, and the paleontologic reports thereon. Mr. Griggs had extensively studied Miocene outcroppings on nearby onshore areas of the Ventura Basin, and found them to be finely grained diatomaceous mudstones and claystones. With respect to the Monterey formation, he conducted basically the same studies as he did on the Miocene. He found the three zones in the Monterey of subject tracts are the same as those which are in that formation in the Santa Maria Valley Basin: (1) Upper zone, siliceous shale, thin bedded, with

some mudstone and claystone; (2) middle zone, thick beds of opaline chert and carbonates, brittle, with minor amounts of diatomaceous mudstone, siltstone and siliceous shale; and (3) lowermost zone, phosphate shale with some opaline chert and carbonates. He testified that the rock in all three zones was fine grained, and that the only way to have effective porosity and permeability in them for production of oil would be to have fracturing. His opinion was that the limited evidence of fracturing in the Monterey formation of subject tracts was not sufficient to assign any potential reservoir area in that formation, particularly in view of the experience in the Santa Maria Valley Basin that the fracturing of that formation was erratic, where wells drilled near producing wells were dry holes.

70. (a) Rogers Pearcy, Senior Staff Engineer, Gulf Coast Region, U.S. Geological Survey, was defendant's witness on the engineering and economic evaluation of subject tracts. He worked with Mr. Yenne and Mr. Griggs on the geologic interpretation, and in cooperation with Mr. Yenne, determined the total net sands and the amount of net oil sands in two of the reservoirs, excepting the Middle Pico reservoir

in the south structure, for which Mr. Yenne counted the net oil sands directly from the well log. Mr. Pearcy commenced his work on subject tracts in January or February of 1970, and spent from 65 to 70 percent of his time on the project until the time of his testimony in this case in March 1971.

(b) Mr. Pearcy graduated in 1956 from Eastern New Mexico University with a B.A. degree in business and economics, and from New Mexico Institute of Mining and Technology in 1960 with a B.S. degree in petroleum engineering. During his school years, he worked as a laborer on drilling operations in oil fields. From 1960 to 1968, he was employed by the U.S. Geological Survey as a staff engineer in the regional office at Roswell, New Mexico, where his duties were primarily evaluations of Indian and federal oil and gas tracts, and also working on unitization projects, both exploratory and secondary types. In 1968, he was transferred to New Orleans, and has held his present position since that time, being regional head of the Reservoir Engineering and Evaluation Section with the New Orleans regional office of the U.S. Geological Survey having jurisdiction over all OCS lands in the Gulf of Mexico. His

regional office has a geologic section staff of 15 to 18 geologists and a paleontologist, a geophysical section of six geophysicists, with his engineering section having six petroleum engineers. The primary function of these sections is to evaluate OCS lands being offered for competitive lease sales in the Gulf of Mexico, and to make estimations of recoverable reserves in existing leases, making calculations of potential reserves and economic evaluations. Since 1968, Mr. Pearcy has participated in and supervised the engineering evaluations of about 250 tracts, both exploratory and drainage types, estimating recoverable reserves and doing the reservoir engineering on the basis of geologic interpretations made. Since becoming a petroleum engineer, he has attended several reservoir engineering schools at which he took courses in well log analysis, and he has extensively used well logs in making economic and engineering evaluations of both exploratory tracts and proven oil and gas properties.

(c) In his studies for preparation of his engineering and economic evaluation of subject tracts, Mr. Pearcy reviewed all of the logs of Pauley's exploratory wells drilled on the tracts, the mud logs and the electric logs,

such as the formation compensation density, the sonic, the sidewall neutron, the resistivity and the spontaneous potential (S.P.) induction logs. To assist Mr. Yenne and Mr. Griggs in assessing the lithology of the Miocene, Mr. Pearcy made a special study of the electric logs to the extent to which they covered that formation, prepared cross plots correlating tha data from various of the electric logs to determine porosity and permeability of the Miocene formation, and concluded that such formation was not a sand-shale sequence as decided by Mr. Heck and Pauley's consulting well log analyst, but was material such as diatomaceous shale, or diatomaceous mudstone, a claystone-type deposit, which would lack effective porosity and permeability for production of hydrocarbons, and would not be reservoir rock. This was basically the conclusion reached by Mr. Griggs in his study of the Miocene on subject tracts. Accepting the lithologic interpretation by Mr. Yenne and Mr. Griggs of the Monterey formation on subject tracts, Mr. Pearcy stated that even if he had been provided with a geologic map of a potential reservoir on subject tracts for such formation, he could not have assigned recoverable reserves, because a Monterey reservoir must have extensive

fracturing, continuing from one portion of the reservoir to another, and because there was no evidence of such continuous fracturing in the Monterey on subject tracts, he would have no confidence in assigning any recoverable reserves in that formation. Mr. Pearcy had worked with fractured shale reservoirs in New Mexico, where the fracturing was determined to be erratic throughout the producing shale formation, where one well would be commercially productive, whereas a nearby offset well would be either a dry hole, or a poor producer.

(d) Mr. Pearcy and Mr. Yenne together made the sand counts in relation to the two reservoirs mapped by Mr. Yenne respectively in the Middle Pico and Repetto formations in the north structure of subject tracts. They used principally the spontaneous potential (S.P.) induction logs, correlating them with the porosity logs, such as the formation density, the sonic and sidewall neutron logs, and also used core information to check the S.P. log readings. They established a shale line on the S.P. logs by observing where the S.P. log was reading shale, which line was the S.P. response of 10 millivolts, and they counted as sands the intervals of depth of the materials which

provided a greater S.P. response than 10 millivolts. Mr. Pearcy testified that this procedure was commonly used for determining sand counts for exploratory projects. He conceded that a well programmed computer analysis might be more accurate than the method employed by them, but that the computer program would add little more accuracy to the overall evaluation, because there were so many other uncertainties involved in the evaluation of an exploratory prospect that they completely overshadow any added accuracy provided by a computer.

(1) With respect to the Middle Pico reservoir on the north structure, sand counts were made of the entire Middle Pico formation in various wells located around the structure, with such wells and their Middle Pico sand counts as follows: Well No. 1 on tract 384, 2,255 feet; Signal core hole I-4, 4,286 feet; Continental core hole SBC-21, 4,006 feet; Continental core hole SBC-6, 1,622 feet; Mobil Well No. 1 on tract 385, 1,070 feet; Union core hole SB-14, 1,052 feet; and Union core hole 8-369, 1,000 feet. Some

of these wells did not completely drill the Middle Pico, but a sand-shale percentage was calculated, and for each of the incomplete wells, a sand count was projected for the full thickness of the Middle Pico at that location by correlation with isochore maps. After arriving at the sand counts for the various wells, the next step was making an estimate of the amount of such sands which could be considered as possible oil sands. This was done by review of the Middle Pico production in oil fields in the Ventura Basin, considering that only part of the sands in a Middle Pico structure was oil sand, and the judgment reached was that for the Middle Pico 25 percent of the total amount of sands was possible oil sand. This percentage was applied to the sand counts in the pertinent wells, and the resulting amounts used to construct a sand map, being projections from the wells through the area of the Middle Pico reservoir, with contouring of the sand count lines within the closure area of the reservoir. The result was 500 feet of sand in the center of the reservoir,

decreasing evenly down to the zero line at the perimeter. This sand count map of the reservoir was used by Mr. Pearcy in his reservoir calculations.

(2) Mr. Pearcy and Mr. Yenne used the same procedure in preparing the sand contour map for the Repetto reservoir on the north structure. One difference was that the sand counts were not made for the full depth of the formation, but were restricted to the upper part, or paleontologic zones 60 through 66, because Mr. Yenne concluded that the lower depths could not be assigned potential reserves. Another difference was that the judgment was reached that 50 percent of the Repetto sands would be possible oil sands. Mobil Well No. 1 on tract 385 and Pauley Well No. 1 on tract 384 were the wells used, and their sand counts were respectively 270 and 650 feet. Mr. Yenne prepared his sand count map on his Repetto reservoir in the north structure, using the same method as on the Middle Pico reservoir in the north structure, and this map was also used by Mr. Pearcy in his reservoir calculations. Of course, Mr. Pearcy also

used Mr. Yenne's sand contour map on the Middle Pico reservoir in the south structure, where the sand count method was different, being the counting of the net oil sands directly from the logs of the pertinent wells.

(e) Mr. Pearcy testified that a petroleum engineer's role in the evaluation of an oil and gas property usually commences when the geologist furnishes the geologic maps on potential reservoirs, and that there are four distinct phases of the engineering and economic evaluation, employed by him on subject tracts and on his previous evaluations. They are as follows:

(1) Collection of data. The engineer looks for rock characteristics, such as porosities, permeabilities, and the types of materials in the reservoir rock. He seeks information concerning the characteristics of fluids in the reservoir, such as water saturation, viscosity of oil, gas-oil ratio, formation volume factor, and formation pressure temperatures. He also finds price and cost data required for economic analysis. For the rock and

fluid characteristics, he turns first to the property being evaluated, obtaining information from wells drilled thereon, and if sufficient data cannot be obtained, then he goes to nearby fields producing from similar age reservoirs for their rock and fluid characteristics. For economic data, he turns to the literature, the experience of oil operators in the area, and information obtainable from his office or from industry sources.

(2) After establishing the various parameters as to the fluid and rock characteristics of the potential reservoir, an estimation is made of recoverable reserves, which is accomp- lished by use of a series of petroleum engineering equations, and if correct parameters are applied, the amounts of recoverable oil and gas are established.

(3) The engineer then prepares a schedule of production of the recoverable oil and gas over the expected life of the reservoir.

(4) The final step is to determine the risk-free and present-worth value based on a series of incomes projected on sales of oil and gas, with deductions of capital and operating costs, and then reduce this present worth value by application of a risk factor or probability of success factor expected for the project.

(f) With respect to each of Mr. Yenne's potential reservoirs, Mr. Pearcy established reservoir parameters, determining some of them by use of Mr. Yenne's map, others by data obtained from wells on subject tracts, and still others by calculations made with standard petroleum engineering formulas and by use of standard correlation charts. His reservoir parameters for each reservoir were the productive area in acres, the average thickness in feet, the acre-feet of reservoir rock, the average depth in feet, the gravity of oil (considerably less than that assigned by Mr. Rakestraw), the gravity of gas, initial reservoir pressure, connate water saturation, permeability in millidarcys, formation volume factor, viscosity, gas-oil ratio, recovery factor in barrels per acre-foot, recovery efficiency percentage, and gas recovery factor percentage.

(g) Applying his reservoir parameters to various standard formulas, i.e., the volumetric formula for the estimation of initial oil in place, the formula for determining the solution gas in the oil in place, statistical formulas for estimating the recovery factor and the recovery efficiency of the deposit, and the formula for estimating the recoverable solution gas, Mr. Pearcy calculated for each reservoir the quantities of estimated initial oil and gas in place, and the estimated recoverable oil and gas.

(h) His calculations of the initial oil and gas in place, with STB meaning stock tank barrels, and MCF meaning thousand cubic feet, are as follows:

Reservoir	Initial Oil in place--STB	Initial gas in place--MCF
Middle Pico north structure: tract 384	374,915,576	74,983,115
Middle Pico south structure: tract 375	18,276,986	2,924,317
Repetto north structure: tract 384	101,640,726	40,656,291
Repetto north structure: tract 375	56,155,096	22,462,038

(i) His calculations of the estimated recoverable oil and gas are as follows:

Reservoir	Recoverable Oil-STB	Recoverable Gas-MCF
Middle Pico north structure: tract 384	78,591,240	59,986,659
Middle Pico south structure: tract 375	3,627,680	2,339,493
Repetto north structure: tract 384	20,176,432	32,525,033
Repetto north structure: tract 375	11,147,200	17,969,630

(j) Mr. Pearcy did not consider the reserves of oil and gas in the Middle Pico reservoir on the south structure in his economic evaluation of subject tracts. His reason was that the recoverable reserves were grossly insufficient in that reservoir to warrant the setting of a platform and other necessary facilities to develop the reserves commercially. He estimated that 20 to 25 million barrels of reserves would be required for commercial production operations, considering that the reservoir site was located on tract 375 where the waters of the Santa Barbara Channel were 575 feet in depth, that the

average well drilled into the reservoir would have a depth of about 5,000 feet, and that the expected life of the production of the reserves would be about 20 years. To estimate the amount of reserves necessary for economic development operations in such a reservoir, he started with the development costs and worked backwards in the evaluation procedure to arrive at the number of reserves that would justify the investment cost.

(k) In computing the estimated recoverable amounts of oil and gas from the reservoirs, Mr. Pearcy considered only primary recovery operations. He rejected secondary recovery for several reasons: (1) These were mappings of potential reserves and not proven reservoirs; (2) Even if each reservoir had had a well drilled that had encountered oil and gas considered sufficient to be exploited by primary means, it does not follow that the characteristics of the fluids and rock would be conducive to a secondary recovery project; (3) Primary fields have produced with the expectation that secondary recovery would be used, but once initiated, secondary recovery was found to be noncommercial; (4) There is considerable

risk in determining for exploratory tracts what the primary reserves are, and this risk is substantially increased as to any secondary reserves; and (5) Production of secondary reserves is generally initiated late in the primary life of the reservoir, and the present worth values of secondary reserves are greatly reduced.

(l) Eliminating the Middle Pico reservoir on the south structure as not commercially producible, Mr. Pearcy made projections of production by years on the other two reservoirs, the Middle Pico and the Repetto on the north structure. Assuming that they would be gas drive reservoirs, he knew that there would be a steady, predictable decline in the production of the wells from their initial rates, and he determined that such rate of decline would be 12 percent per year on both the Middle Pico and Repetto reservoirs, based on his review of fields producing in the Ventura Basin. Allowing for the time for construction of two platforms and their producing wells, and having computed the initial production rate at 600 barrels per day for each of the 40 Middle Pico

wells, and at 300 barrels per day for each of the 30 Repetto wells, he projected the production of gas and oil year by year throughout the 24-year period of the commercial life of the project. Because the rates of recovery in the wells finally decline to an amount no longer permitting economic recovery, Mr. Pearcy's calculated amounts of economically recoverable oil and gas were somewhat less than his above-stated amounts of recoverable oil and gas, and for the two reservoirs remaining in consideration, are as follows:

Reservoir	Economically Recoverable Oil-STB	Gas-MCF
Middle Pico		
north structure:		
tract 384	78,591,240	59,832,863
Repetto		
north structure:		
tract 384	20,067,824	31,700,796
tract 375	11,045,081	15,969,573

All of these amounts of economically recoverable hydrocarbons were spread out through the 24-year period of production as projected by Mr. Pearcy.

(m) Mr. Pearcy calculated the capital costs for the Middle Pico platform and 40 wells, the Repetto platform and 30 wells, the pipeline and onshore facilities, and other necessary capital expenditures, and allocated them to the first 3 years of the project in the successive amounts of $16,970,000, $17,355,000, and $1,375,000.

(n) Prevailing market prices for crude oil are pegged to degree of oil gravity (API), the prices increasing in steps from the low to the high gravity. Mr. Pearcy determined from reports of cores recovered from the Pauley wells that oil gravity of the Middle Pico crude would be 15 degrees, and that of the Repetto, 18 degrees. The prevailing prices in the Ventura Basin area for such gravity crudes as of February 1, 1969, were respectively $1.91 per barrel and $2.09 per barrel. The prevailing price for gas was $0.27 per MCF. Mr. Pearcy applied these unit prices to the total amounts of oil and gas production for each year, and arrived at total gross revenues of $244,154,360 for all 24 years. This latter amount was reduced to a total gross income amount of $203,463,594, arrived at by deducting in each

year a royalty rate of 16-2/3 percent of gross revenue. Although distributing the operating expenses throughout the years, the total of $38,383,740 of such expenses for 24 years was deducted from the total gross income figure to arrive at the sum of $165,079,854, being the total net income before taxes. This latter figure was adjusted to show the total cash flow throughout the 24 years to be $129,379,854. The particular adjustment made was that during the first 3 years, the net income figure was reduced in each year by the amount of the capital expenditure for that year, but otherwise the cash flow figure and the net income figure were the same in each year throughout the remainder of the 24 years. For each year, the cash flow figure was reduced by a present value discount factor, being .9302 in the first year and gradually decreasing to .0334 in the 24th year of production. In this manner, a present worth value for each production year was computed, and the total present worth value for the 24 years of production was $36,191,915. This sum is Mr. Pearcy's opinion as to the present worth value of subject tracts as of February 1969, without application of any risk factor. He explained that a buyer would pay

that sum for the series of future net incomes indicated by the cash flow to enjoy a 15 percent rate of return on his invested capital, if he were sure that the two reservoirs would be as mapped by the geologist, that the reserves would not be less than those calculated, that production of oil and gas would be at the rates and to the extent estimated, and that net income from production would be as predicted. To hedge against the many variables, he would reduce that sum by assessment of a risk factor.

(o) Mr. Pearcy applied a weighted average probability of success factor of 9.62 percent to his $36,191,915 total present worth value of subject tracts, and using a formula taking into account additional decrease in value due to cost wastes on account of the less than complete success of assumed future operations, arrived at a fair market value of $2,196,737 for both of subject tracts. Of this latter amount, he allocated 11.2 percent to tract 375 and 88.8 percent to tract 384, thus reaching the conclusion that the fair market value of tract 375 was $326,680 and that of tract 384 was $2,590,107. The methods and principles employed in these determinations are now detailed.

(1) Mr. Pearcy and Mr. Yenne worked together in determining the probability of success factor which they deemed applicable in the economic evaluation of subject tracts, with the primary responsibility being that of Mr. Yenne. Five categories were considered as to each reservoir, and as to each category a percentage of risk was assessed, expressed in decimal figure, as follows:

Categories	Reservoirs - north structure Middle Picco	Repetto
1. Basin position	.80	.80
2. Structural closure	1.00	1.00
3. Amount of sand	1.00	1.00
4. Reservoir conditions	.90	.85
5. Presence of hydrocarbons	.13	.15
Probability of success factors	.936	.102

Each reservoir probability of success factor was the product of the successive

multiplications of the category assessments in its column — Middle Pico, .80 x 1.00 x 1.00 x .90 x .13 = .0936. The weighted probability of success factor for both reservoirs was determined to be .0962 (9.62 percent) as follows: The value of the economically recoverable reserves on the Middle Pico reservoir was multiplied by .0936; the value of such reserves on the Repetto was multiplied by .102; the two products were added; and the sum of the two products divided by the total value of the economically recoverable reserves on both tracts.

(2) Basin position. In this category of assessment of risk for each reservoir, Mr. Yenne reviewed the history of production of hydrocarbons in the Ventura Basin, studied geologic maps of the various anticlinal structures and trends, observed that there were such structures on trends, which either had no hydrocarbon accumulations or insufficient amounts to be commercially producible, considered that subject tracts were on a trend which had produced substantially less than the

Rincon trend, and concluded in his judgment that an 80 percent risk factor should be applied for each of the potential reservoirs.

(3) Structural closure and Amount of Sand. In these two categories of assessment of risk for each reservoir, the risk factor assigned was 100 percent, meaning that in Mr. Yenne's judgment the geologic interpretations and mappings were predictably accurate, with no inherent risk involved. Mr. Yenne testified that in the overall geologic and engineering evaluation of subject tracts, defendant's team used what was considered optimum conditions, and no consideration was given to possibly better conditions in assessing risk factors in the various categories.

(4) Reservoir conditions. Mr. Pearcy was primarily responsible for assessing the risk involved in this category, and involved was the reliability of the various reservoir parameters applied in the engineering evaluation, with primary concern being with respect to

the effective porosity and permeability in the potential reservoirs, and with the resulting judgments being that risk factors were 90 and 85 percent respectively for the Middle Pico and Repetto reservoirs.

(5) Presence of hydrocarbons. From the foregoing, it is obvious that the assignment of the low percentage risk factors of 1.3 and 1.5 percent in this category was the primary reason for the low probability of success factors olf 9.36 and 10.2 percent determined for the two potential reservoirs. With respect to the Middle Pico reservoir, Mr. Yenne considered the mud logs of wells and core holes located high on the overall anticlinal structure and surrounding the reservoir structure, i.e., Well No. 1 on tract 384, just east of the reservoir boundary, Signal core hole CHI-4, slightly north of the reservoir, Union core hole SB-14, near the south boundary of the reservoir, and Continental core hole SBC-6, somewhat to the west of the Boundary Line fault, forming the west boundary of the reservoir. All of these wells penetrated in whole or in part the Middle Pico formation, and

Mr. Yenne concluded that none of them had significant hydrocarbon shows. This was the primary reason why he assigned the low risk factor in this category to the Middle Pico reservoir. With respect to the potential reservoir on the Repetto, he reviewed the mud log of Well No. 1 on tract 385, just west of the west boundary (Boundary Line fault) of the Repetto reservoir, high on the overall anticlinal north structure extending from tract 384 into tract 385, observed that such well was a dry hole, and stated that such well would have condemned the Repetto potential reservoir as not containing hydrocarbons, except for the possibility that the Boundary Line fault is a sealing mechanism. In this category, Mr. Yenne also considered the matters involved in his analysis of the "Basin position" category.

(p) Mr. Pearcy's equity allocation of his $2,196,787 fair market value of both tracts to the individual tracts was determined by calculating with respect to each tract, the percentage relationship of the value of the economically recoverable reserves on that tract to the total value of such reserves on both

tracts. This resulted in an 11.2 percent allocation of the total fair market value to tract 375, or the sum of $326,680, and 88.8 percent to tract 384, or $2,590,107.

71. (a) On January 28, 1969, a major crisis occurred in the extensive exploratory and development operations being conducted on the OCS lands in the Santa Barbara Channel. Union Oil well A-21 on platform A on lease tract OCS-P-0241 blew out. It was drilled as part of the oil and gas production operations on the offshore Dos Cuadras field, located about midway in the approximately 13-mile distance south-southeast from the Santa Barbara harbor to the north limits of subject tracts. The drilling crew was in the process of removing the drill stem from the well to run the electric logs, after the drilling had been completed to total depth, when oil and gas proceeded to blow out through the drill pipe. The well itself was brought into control by vigorous use of three different types of blowout equipment on the drilling platform, but shortly after the blowout through the well had ceased, oil commenced to boil up through the ocean floor into the water near the well, with the largest eruption about 800 feet east of

the platform. A relief well was drilled, and the oil spill was finally stopped on February 8, 1969, except for minor seepage remaining. About 10,000 barrels of oil had escaped into the channel waters. This created a massive oil slick about 50 miles square, at first contained on the water offshore, but with a change of wind direction, the oil spill moved into the Santa Barbara harbor and onto the beaches for a 28-mile stretch from a point west of Santa Barbara all the way to Ventura on the east, heavily coating that area.

(b) Pauley had completed and abandoned its last drilled exploratory well 4 days before the Union well blowout, and thereafter no drilling operations were conducted on either of subject tracts. Pauley had obtained approval of its Operating Committee to drill Well No. 2 on tract 384 on January 23, 1969, prepared and filed its application for a permit to drill such well on February 11, 1969, and from January 29 to February 12, 1969, was negotiating a contract with the owner of an available drilling vessel for use on the planned well, which contract was executed by the owner, but not by Pauley, for lack of a drilling permit. The application for the drilling permit was

held by defendant at first in the Los Angeles regional and district office of the Geological Survey, and later in the newly created Santa Barbara district office, and was never granted or denied by defendant.

(c) The Santa Barbara oil spill and its consequences were widely publicized, created immediate and extensive adverse public reaction, expressed by the media, California state and local officials, environmentalists, and members of Congress, with prompt actions taken by Secretary of the Interior Hickel with respect to further oil exploratory and production operations on the OCS lands in the Santa Barbara Channel.

72. (a) Secretary of the Interior Walter J. Hickel took office on January 24, 1969, 4 days before the Union well blowout. The chain of authority from him to the regional and district offices of the Geological Survey handling the administration of the OCS lands in the Santa Barbara Channel remained at relevant times as follows: The office of Under Secretary was vacant. The Assistant Secretary for Mineral Resources was J. Cordell Moore, who had submitted his resignation on January 20, 1969,

and did not participate in official actions resulting from the oil spill. Dr. William T. Pecora was Director of the Geological Survey, and his Chief of the Conservation Division was Dr. Russell Wayland. Under Dr. Wayland was Robert Speer, Chief of the Branch of Oil and Gas Operations. Under Mr. Speer was D. W. Solanas, Regional Oil and Gas Supervisor for the West Coast Region, and the Deputy Supervisor was Fred Schambeck. One division of the West Coast Region was the Los Angeles District Office which had jurisdiction over the Santa Barbara area until February 17, 1969, when a new District Office was opened at Santa Barbara, California, with jurisdiction over the OCS lands in the channel. The District Engineer had authority to grant applications for permits to drill on OCS lands within his district. John Fackler was the Los Angeles District Engineer, and his deputy, H. T. Cypher was the Acting District Engineer when the Union well blew out. Mr. Cypher became the Santa Barbara District Engineer when the new district office was opened. Pauley's application for a permit to drill Well No. 2 on tract 384 was filed in the Los Angeles office and transferred to the Santa Barbara office. No action was taken by either District Engineer on Pauley's application for reasons to be stated.

(b) When the Union well blew out, Regional Supervisor Solanas, then in Wyoming, was advised and promptly traveled to Santa Barbara, and supervised remedial activities on the platform. Eugene Standley, a petroleum engineer on the staff of the Assistant Secretary for Mineral Resources, and Dewey Acuff, a petroleum engineer serving as Assistant Chief of the Geological Survey's Conservation Division, were sent from Washington, D.C., to aid Mr. Solanas. Having been advised of the blowout on the day of its commencement, Secretary Hickel conferred with Dr. Pecora on February 2 concerning developments, and flew that day to Santa Barbara, accompanied by his immediate assistant, and by Edward Weinberg, Solicitor of the Department of the Interior. Secretary Hickel viewed from a Coast Guard airplane the extent of the oil slick and the operations on the platform. On February 3, a meeting was held at a Santa Barbara hotel, at which Solanas, Standley and Acuff were advised that the oil companies then drilling on Federal leases in the channel had voluntarily ceased their operations at the request of Secretary Hickel, pending review and clearance of the operations, that Standley, Solanas and Acuff were designated by the Secretary to conduct a

prompt review, and that Standley was authorized by Secretary Hickel to give Departmental clearance to those operations determined to be satisfactory from the standpoint of avoiding the occurrence of another blowout. This review continued into the night of February 3, and after a well-by-well review, the companies involved were authorized by Mr. Standley to resume drilling.

(c) At Washington, D. C., Secretary Hickel issued press releases on February 4 and 6, confirming the authorization of resumption of drilling, stating that safety precautions considered necessary by the reviewing engineers could be instituted immediately. On February 5, George Clyde, a member of the Santa Barbara County Board of Supervisors, testified in Washington, D. C., before the Senate Subcommittee on Air and Water Pollution (Senator Edmund S. Muskie, Chairman) sharply criticizing the resumption of drilling. Senator Muskie then announced that public hearings would be held by his subcommittee at Santa Barbara, and they were held February 25-26, 1969, with further hearings thereafter at Washington, D. C., with Secretary Hickel as a witness. The record in this case is replete with evidence

that the previously existing hostility of Santa Barbara residents to oil exploration and development in the Santa Barbara Channel was aroused by the oil spill and its damaging consequences.

(d) Shortly after his return from Santa Barbara, Secretary Hickel held a meeting with Dr. Pecora, and stated that he had three programs to be accomplished. First, he wanted to determine the cause of and to stop the oil spill. Secondly, he requested review of all OCS regulations and orders to determine adequacy of safety provisions, and to make sure that they were sound and sufficiently strong to insure safe operations. Thirdly, steps were to be taken to make sure that lessees were providing the Geological Survey with all information on geology, geophysics and engineering on all of the leases.

(e) On February 7, 1969, Secretary Hickel sent separate telegrams to chief executive officers of Phillips, Texaco, Humble, Mobil and Union oil companies. These companies were then the only lessees engaged in operations on OCS lands in the Santa Barbara Channel, and their operations were suspended by Secretary Hickel. Each telegram stated as follows:

> Pursuant to the provisions of applicable laws and regulations, including 30 CFR 250.12, you are requested and directed to cease all drilling and production operations on lease no. [appropriate lease number(s) stated] pending further notice.

The relief well being drilled by Union to stop the oil spill was excepted. No other lessee of an OCS tract in the channel was sent such a telegram.

(f) In his testimony as a witness in this case in December 1970, shortly after he had resigned as Secretary of the Interior, Mr. Hickel testified that he sent the telegrams shutting down operations to enable him to have time to evaluate the situation in the channel and to permit a review of the OCS regulations and orders, and that he considered the shutdown to be temporary. That that was his intention is accepted as credible. However, the "temporary" shutdown became extended, with concurrently mounting political pressures, and Secretary Hickel announced on March 21, 1969, that drilling and production would remain shut down in the Santa Barbara Channel indefinitely until he was satisfied that development of natural resources could be managed without endangering natural resources, and on April 1, that he was maintaining a shutdown on OCS lands in the channel, and as late in his tenure as September 15, 1970, that channel lessees had not drilled because they had not been granted permits.

(g) On February 7, 1969, Secretary Hickel advised Dr. Pecora about his shutdown telegrams, and told Dr. Pecora that in view of the gravity of the Santa Barbara situation, he wanted all actions relating to that area to be brought back to Washington for his personal attention and approval. On that day, Dr. Pecora by telephone advised Regional Supervisor Solanas of these instructions, and Mr. Solanas in turn advised Mr. Cypher and other members of his staff about the telephone call, informing them that the authority in the Oil and Gas Regulations, 30 C.F.R. 250, applicable to the approval authority delegated to the Regional Supervisor and the District Engineer, was verablly amended by Secretary Hickel, in that the Secretary was assuming the role of approving operations in the Santa Barbara Channel until such time as there would be a specific redelegation of authority to the Supervisor and the District Engineer.

73. (a) The two subject leases covering tracts 375 and 384 (OCS-P-0218 and OCS-P-0226), effective March 1, 1968, conformed to the provisions of defendant's notice of sale, previously summarized in finding 20, including inter alia the royalty rate of 1/6 payable to lessor. Such leases were prepared on a standard official form -- Department of the Interior, Bureau of Land Management Form 3380-1 (February 1966) [formerly 4-1255], as were all of the leases issued at the general lease sale involved in this case.

(b) Each lease was made expressly

* * * subject to the terms and provisions of the Outer Continental Shelf Lands Act of August 7, 1953 (67 Stat. 462; 43 U.S.C., Sec. 1331, et seq.) *** and to all lawful and reasonable regulations of the Secretary of the Interior * * * when not inconsistent with any express and specific provisions herein, which are made a part hereof.

(c) Section 1 of each lease grants to the lessees

* * * the exclusive right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits except helium gas in or under [the leased tract], together with:

(a) the nonexclusive right to conduct within the leased area geogolical and geophysical explorations which are not unduly harmful to acquatic life;

(b) the right to drill water wells within the leased area and use free of cost, and to dispose of, water produced from such wells; and

(c) the right to construct or erect and to maintain within the leased area all artificial islands, platforms, fixed or floating structures, sea walls, docks, dredged channels and spaces, buildings, plants, telegraph or telephone lines and cables, pipelines, reserviors, tanks, pumping stations, and other works and structures necessary or convenient to the full enjoyment of the rights granted by this lease, for

a period of 5 years and as long thereafter as oil and gas may be produced from the leased area in paying quantities, or drilling or well reworking operations, as approved by the Secretary, are conducted thereon; * * * .

(d) Certain lease provisions subject the lessees to unitization or pooling agreements approved by the Secretary. Such agreements come into play when oil and gas reserves are proven to exist on the leased tract, which extend into an adjacent tract or tracts.

(e) Except for defendant's argument that the language quoted in subparagraph (b) of this finding contemplates amendment of or additions to then existing OCS regulations and orders by the Secretary, as authorized by Section 5(a)(1) of the cited OCS Act, and except for a provision in the lease for restriction of exploration and operations on the leased tract if that area be designated by the Secretary of Defense, and approved by the President, as needed for national defense, there are no other provisions of the lease which place restrictions on the rights of

the lessees to drill, if the drilling is done in accordance with regulations and orders existing at the time of the execution of the lease.

(f) Section 2 of each lease, called Obligations of Lessee, provided, inter alia that the lessees agree in subsection (i) as follows:

> (i) Diligence. To exercise reasonable diligence in drilling and producing the wells herein provided for; to carry on all operations in accordance with approved methods and practices including those provided in the operating and conservation regulations for the Outer Cntinental Shelf; to remove all structures when no longer required for operations under the lease to sufficient depth beneath the surface of the waters to prevent them from being a hazard to navigation; to carry out at expense of Lessee all lawful and reasonable orders of the Lessor relative to the matters in this paragraph, and that on failure of the Lessee so to do

> the Lessor shall have the right to enter on the property and to accomplish the purpose of such orders at the Lessee's cost: Provided, That the Lessee shall not be held responsible for delays or casualties occasioned by causes beyond the Lessee's control.

(g) Another subsection of Section 2 of the lease -- (d) Wells — provided in its paragraph (1) that Lessee agrees to drill wells to protect Lessor from loss by reason of production on other properties, and in its paragraph (2), Lessee agrees:

> (2) After due notice in writing, to drill and produce other wells as the Secretary may reasonably require in order that the leased area or any part thereof may be properly and timely developed and produced in accordance with good operating practice.

(h) There is no language in the lease or in then existing OCS regulations and orders which expressly provide for absolute liability on the part of the lessee for any oil spill

and resulting damages from operations on the lease tract.

74. (a) In accordance with the authority vested in him by OCS regulation, 30 C.F.R. § 250.12(a), Regional Supervisor Solanas on March 31, 1965, promulgated OCS Order No. 7 covering operations within his region, which order remained in force and effect at all relevant times in this case. Such order provides:

> Pollution and Disposal of Waste Material

The Leasing and Operating Regulations for the submerged lands of the Outer Continental Shelf provide as follows:

> 30 CFR 250.42 Pollution. "The lessee shall not pollute the waters of the high seas or damage the acquatic life of the sea or allow extraneous matter to enter and damage any mineral - or water-bearing formation. The lessee shall dispose of all useless liquid products of wells in a manner acceptable to the supervisor."

All oil and gas well drilling and producing operations shall be conducted in such a manner as to preclude the pollution of the waters of the Pacific Ocean within this Region. The disposal of liquid waste materials into the ocean shall be limited to salt water and other materials which have been treated, when necessary, for the removal of constituents which may be harmful to aquatic life or injurious in any manner to life or property. No oil or other hydrocarbon in any form or combination with other material or constituent shall be disposed of into the ocean waters. All mud containers and other nonliquid waste materials, which may be harmful or hazardous to life or proprety, or which result in any unsightly appearance, shall not be discarded into the Pacific Ocean.

Immediate corective action shall be taken in all cases where accidental pollution has occurred.

Lessee and approved operators in the Outer Continental Shelf are also responsible for all leasehold operations conducted

by drilling and other contractors and shall make certain that the contractors have been informed to comply with the requirements contained herein and any oral order issued for corrective action by the Supervisor or any of his authorized representatives.

(b) On March 1, 1968, following the general lease sale of OCS tracts, Supervisor Solanas sent a notice to all lessees, providing copies of a poster entitled "No Pollution," and directed that such poster be in evidence offshore on all platforms, drilling vessels and other facilities, and that compliance would be enforced with inspections conducted by regional personnel. The poster prominently set forth the provisions of OCS Order No. 7, above quoted.

(c) The other Pacific Regional OCS orders in effect on and after March 1, 1968, were Orders 1 through 6, and 8 and 9. Only two of these mentioned degree of care in operations: Order No. 2 quoted OCS regulation 30 C.F.R. 250.40, directing the lessee to take "all reasonable precautions" for keeping all wells

under control, and prescribed minimum casing, cement and blowout preventers for drilling operations; and Order No. 5 quoted OCS regulation 30 C.F.R. 250.40(b), directing the lessee to take "all reasonable precautions" to prevent blowout of any well and to take immediate steps and exercise "due diligence" to bring any such well under control, and provided specifications for installation of storm chokes or similar subsurface safety devices in wells capable of flowing oil and gas. The other Orders related to marking of wells and platforms, plugging and abandonment of wells, extension of an OCS lease beyond its primary term, approval procedure for tubingless completion of oil and gas wells, drilling of core holes, and special requirements for fixed platforms.

75. (a) Interior officials in Washington, D.C., under the direction of Dr. Pecora, including representatives from the Bureau of Land Management, the Solicitor's office, and the Geological Survey, conducted a review of the OCS orders relating to the West Coast and the Santa Barbara Channel.

(b) Pursuant to telegram notices issued by Secretary Hickel, a meeting was held in Washington, D.C., with representatives of the oil industry on February 20, 1969, for consideration of proposed changes to the OCS orders, with Dr. Pecora presiding. Various oil companies presented comments on such proposals. Pauley had received copies of the proposed changes, and also had learned through the media and by informal inquiry of the revision of OCS regulation 30 C.F.R. § 250.42, which was published in the Federal Register on February 21, 1969. Prior to the meeting, Pauley's Vice President of Acquisitions, Lawrence E. Scott, met with Dr. Pecora who advised Mr. Scott that the agenda of the meeting was limited to the proposed changes in the OCS orders, precluding any discussion of the regulation revision. Also, prior to the meeting Mr. Scott tried unsuccessfully to meet with Secretary Hickel, who was absent in attendance at a House subcommittee hearing, but he met with Lewis Helm, an aide to the Secretary, who stated that the Secretary had already signed the regulation revision, and that the matter was no longer open for discussion. Mr. Scott was carrying Pauley's letter of protest to the new regula-

tion, addressed to the Secretary, and he left it with a receptionist in the Secretary's suite. The Secretary subsequently acknowledged receipt of the letter. At the meeting before Dr. Pecora, Mr. Scott presented Pauley's comments regarding the OCS order changes, and also a copy of Pauley's letter of protest about the new regulation. The new regulation is hereinafter described.

(c) The proposed changes in the OCS orders were then sent to Supervisor Solanas who met at Los Angeles with representatives of lessees operating on OCS lands in the Santa Barbara Channel. On March 17, 1969, Supervisor Solanas presented to Interior officials at Washington, D.C., the industry comments submitted at the field meeting.

(d) On March 21, 1969, at a press conference held in the hearing room of the House Committee on Interior and Insular Affairs, Secretary Hickel issued his prepared statement of an Interior Department news release, in which he observed that the recent Santa Barbara Channel oil well blowout was a

tragedy, blackening some of the most beautiful beaches in the world, killing wildlife and destroying property. He commented that officials who a year ago allowed oil production in the channel would have welcomed a preview of recent events, and that the economic pressures which dictated the $603 million lease sale at the expense of the environment would not have prevailed. He reviewed what he had done in the way of remediable steps, and had attached to his news release a copy of the March 19, 1969 draft of new OCS Order No. 10. This is the occasion when Secretary Hickel stated that drilling and production in the channel would be shut down indefinitely until he was satisfied that development of natural resources would not endanger the environment.

(e) In its final form, new OCS Order No. 10 was issued by Secretary Hickel on March 28, 1969, and it expressly terminated OCS Order No. 2, and substituted its requirements in lieu thereof. It recited that each application for a drilling permit submitted for approval had to include the casing, cement, mud and blowout preventer programs for the well which complied with the requirements of the new Order. The new requirements were considerably expanded

over those specified in superseded Order No. 2 and other OCS orders. On April 4, 1969, Supervisor Solanas provided copies of OCS Order No. 10 to all companies holding leases on the OCS lands in the Santa Barbara Channel.

(f) At the news conference on March 21, 1969, Secretary Hickel observed in his prepared statement that he had "issued an order making oil companies absolutely liable for pollution if it occurs in the future, regardless of whether or not they are at fault." Obviously, he was referring to his recent amendment of regulation 30 C.F.R. § 250.42.

(g) On February 17, 1969, there was published in the Federal Register an amendment to the OCS regulation concerning pollution, 30 C.F.R. § 250.42, which Secretary Hickel had executed shortly before. Assistant Secretary of the Interior Moore and Dr. Pecora did not participate in the consideration and preparation of the amendment. Secretary Hickel did confer with members of his staff, personnel in the Interior Solicitor's office, and representatives of the Federal Water Quality Administration. Rule making procedures were not invoked,

and interested parties were neither invited nor given an opportunity to address themselves to the question of issuance of this regulation amendment. As published in the Federal Register, such amendment reads as follows:

> The purpose of this amendment is to set forth in greater detail the responsibility of lessees for the cost of cleanup and for damages from oil pollution resulting from operations under the Outer Continental Shelf Lands Act. The amendment is found to be necessary and proper in order to provide for the conservation of the natural resources of the Outer Continental Shelf.
>
> It is the policy of the Department whenever practicable, to afford the public an opportunity to participate in the rule making process. This proceedure is deemed unnecessary in this case because the amendment involves public property. Furthermore, it is contrary to the public interest to delay the effective date of this amendment. Accoringly, the amendment shall become effective on publicaiton in the FEDERAL REGISTER.

Present § 250.42 is designated as 250.42(a) and a new paragraph (b) is added to read as follows:

250.42 Pollution.

* * * * *

(b) If the waters of the high seas are polluted by the drilling or production operations of the lessee, and such pollution damages or threatens to damage aquatic life, wildlife, or public or private property, the control and removal of the pollutant and the reparation of any damage, to whomsoever occurring, proximately resulting therefrom shall be at the expense of the lessee, and on failure of the lessee to control and remove the pollutant the Supervisor, in cooperaion with other appropriate agencies of the Federal, State, and local governments, or in cooperation with the lessee, or both, shall have the right to accomplish the control and removal of the pollutant at the cost of the lessee, but such action shall not relieve the lessee of responsibility for reparation of damages as provided herein.

* * * * *

76. After the commencement of subject suit on April 9, 1969, the Department of the Interior conducted rule making procedures, by publication of notices in the Federal Register, and by receiving from interested parties comments, suggestions and objections, concerning proposed amendments of various OCS regulations in 30 C.F.R. part 250. On August 22, 1969, the resulting amendments were promulgated by Acting Secretary of the Interior Mitchell Melich and published in the Federal Register. Among the substantial number of such amendments, regulation § 250.42(a) and (b), as promulgated February 21, 1969, were redesignated as § 250.43(a) and (b). Some minor changes were made by new § 250.43(a). As to new § 250.43(b), it was stated that there was considerable confusion and doubt (as revealed by the comments, suggestions and objections received) as to the original intent and purpose of old § 250.42(b), as promulgated February 21, 1969, which had been misunderstood, and that the new § 250.43(b) was an amendment of the old for the purpose of clarification, with a new paragraph (c) added. As thus promulgated, regulation § 250.43(b) and (c) read as follows:

(b) If the waters of the sea are polluted by the drilling or production operations conducted by or on behalf of the lessee, and such pollution damages or threatens to damage aquatic life, wildlife, or public or private property, the control and total removal of the pollutant, wheresoever found, proximately resulting therefrom shall be at the expense of the lessee. Upon failure of the lessee to control and remove the pollutant the supervisor, in cooperation with other appropriate agencies of the Federal, State and local governments, or in cooperation with the lessee, or both, shall have the right to accomplish the control and removal of the pollutant in accordance with any established contingency plan for combating oil spills or by other means at the cost of the lessee. Such action shall not relieve the lessee of any responsibility as provided herein.

(c) The lessee's liability to third parties, other than for cleaning up the pollutant in accordance with paragraph (b) of this section shall be governed by applicable law.

77. (a) In implementation of Secretary Hickel's instructions to Dr. Pecora concerning determination of the cause of the Union well blowout, the taking of steps to make sure that the lessees were providing the Geological Survey with all information on the geology, geophysics and engineering on all OCS leases, and the requirement that all actions relating to the Santa Barbara Channel OCS lands were to be subject to the approval of the Secretary, Dr. Pecora created and appointed personnel on three task forces to conduct investigations in the Santa Barbara Channel area. Task forces I and III related to the determination of the cause of the blowout and oil spill, and their assignments were repsectively to study the technical subsurface conditions in and about the Dos Cuadras oil field, and to make oceanographic study of the ocean floor in and about that area.

(b) The creation of task force II related to the clearance by the Secretary of further exploratory and production operations on the OCS tracts in the Santa Barbara Channel. Its assignment was first to review all of the pertinent engineering, geologic, seismic and geophysical information on the lease tracts

shut down by the Secretary's telegram of February 7, 1969, and subsequently to continue reviewing such technical information on all other tracts so as to arrive at a conclusion that exploratory drilling could be done with minimal risk on such tracts should a decision be necessary. Obviously such a decision would be necessry on tract 384 if Pauley continued to intend to conduct future drilling on that tract, as indicated by its application to drill Well No. 2, received on February 11, 1969, by the Los Angeles District Engineer, and transferred to the Santa Barbara District Engineer shortly after February 17, 1969.

(c) On March 1, 1969, in furtherance of the program assigned to Dr. Pecora, Secretary Hickel sent a telegraphic message to all lessees holding interests in OCS leases in the Santa Barbara Channel, stating as follows:

> THE DEPARTMENT OF THE INTERIOR'S REVIEW OF THE FACTORS AFFECTING THE SAFTY OF DRILLING OPERATIONS IN THE SANTA BARBARA CHANNEL WILL REQUIRE THAT WE HAVE ACCESS TO ALL AVAILABLE GEOLOGICAL, GEOPHYSICAL AND STRUCTURAL INFORMATION. YOU ARE REQUESTED TO SUBMIT SUCH INFORMATION THROUGH THE

> REGIONAL OIL AND GAS SUPERVISOR, LOS ANGELES, CALIFORNIA. THE REQUIRED INFORMATION IS IN ADDITION TO INFORMATION ALREADY BEING SUBMITTED UNDER PROVISIONS OF 30 CFR 250 WITH RESPECT TO WELLS, PLATFORMS, ETC. BE ASSURED THAT PROPRIETARY INFORMATION WILL BE SAFEGUARDED AND NOT RELEASED FOR PUBLIC INSPECTION.

(d) Prior to March 1, 1969, Dr. Pecora had discussed with Dr. Wayland, Chief of the Conservation Division, the program of the three task forces, and in particular task force II, advising that the latter would make its review and report to Dr. Wayland, who would review the task force recommendations and then report to Dr. Pecora who would in turn review the work and make a recommendation to the Secretary for his approval.

(e) Shortly after March 1, 1969, Dr. Wayland telephoned John Fackler, who had recently been promoted to senior staff engineer of the Pacific Coast Region, and Keith Yenne, staff geologist of the same region, the same Mr. Yenne who later served as defendant's principal witness on the geologic interpretation of subject tracts. Dr. Wayland advised

them that the was forming task force II composed of Fackler and Yenne to study, on a lease-by-lease basis, the engineering and geology of each OCS tract in the Santa Barbara Channel to ascertin if safe operation could be conducted, with Fackler to handle the engineering and Yenne the geologic part of the study. Dr. Wayland further advised that they were to submit a report to him, based on their examination of information to be obtained from lessee companies and on data in the files of the Geological Survey, and that each tract had to be cleared at Washington, D. C., before further operations could be approved on that tract. Dr. Wayland gave only broad instructions, and left to Fackler and Yenne the determination of what information they would need and the procedure to be followed in their part of the lease tract clearance procedure. Fackler and Yenne were not authorized to approve drilling permits, but they took into consideration any existing drilling plans. They used Secretary Hickel's telegram of March 1, 1969, as the vehicle for obtaining necessary information from lessees.

(f) In conducting their lease-by-lease review of the OCS channel tracts, Fackler

and Yenne contacted the lessees, explained the clearance procedures, and advised that they would prepare a report as to whether safe drilling could be done, and send the report to Washington, D. C., for approval. They requested the lessees to furnish information about geologic formations near the ocean floor of the tract, a contour map of a shallow horizon, a geophysical section supporting the horizon mapping, a geologic cross section of the entire tract, a geologic cross section of the thicknesses of formations to be drilled and potential reservoirs, safety and measuring devices to be used in the mud circulating system, blowout prevention equipment to be used, standby safety equipment to be provided, and the well casing program. Usually they held a meeting with representatives of the lessee to discuss the information provided, and sometimes they requested additional information. They independently made their geologic and engineering studies, and then coordinated their work into a report which summarized all of the information furnished, as well as any material on file in the Pacific Region office, and recommended that safe drilling could be accomplished on the tract.

(g) Task force II gave priority to the review of the five tracts, operations on which had been shut down by Secretary Hickel by his telegrams of February 7, 1969, and four of them, Phillips' OCS-P-0166, Mobil's OCS-P-202, and Humble's OCS-P-0190 and OCS-P-0188, were cleared for operations by the Secretary on April 1, 1969. In addition, Mobil's tract OCS-P-0203 was cleared the same day by the Secretary, this clearance having been promptly accomplished because Mobil had furnished the required information at the same time as on its other tract. The only other tract shut down by order of the Secretary -- Texaco's OCS-P-0234 -- was cleared at a later date because of slowness in furnishing of information.

(h) Task force II had the assigned function of reviewing all OCS tracts in the Santa Barbara Channel, and most of such tracts were in time cleared by the Secretary. The clearance procedure did not and could not commence until the lessees furnished the required information on a lease-by-lease basis. If a lessee failed to furnish the information, its lease was not cleared. Most oil companies did furnish such information, and had their tracts cleared. Once a lease was cleared in

the overall procedure, the authority to grant drilling permits and approve operations was restored to the Regional Supervisor and the District Engineer as to the cleared tract. The District Engineer could then approve or disapprove operations thereon.

(i) Neither tract 374 nor tract 384 was ever cleared -- by Task force II or otherwise. There have been no operations on either tract since the last exploratory well was drilled and abandoned on tract 375 in January 1969 just prior to the Union well blowout. No application was ever filed by plaintiffs for a permit to drill a further well on tract 375. Plaintiffs' application for a permit to drill Well No. 2 on tract 384 has not been approved by the District Engineer because he lacks authority without a clearance of the tract, and in any event it does not comply with the provisions of OCS order No. 10.

78. (a) On March 12, 1969, a special meeting of plaintiffs' Operating Committee was held with all plaintiffs (voluntary and involuntary) and TransOcean represented. The minutes of the meeting state that its purpose was:

(1) to discuss the problems due to the changing of the regulations by the Secretary of Interior imposing absolute liability on the lessees in the Santa Barbara Channel;

(2) discuss the effect that the suspension of all operations in the Santa Barbara Channel is having on our Group; and

(3) the demand made upon the members of our Group by the Secretary of Interior requiring certain geological, geophysical and structural information to be furnished to the United States Geological Service.

Pauley announced it had retained a law firm to evaluate the legal questions involved, and attorneys of the firm, John P. Ohl and H. Richard Schumacher were present. Mr. Ohl presented his legal advice. It was announced that Mr. Ohl's firm would prepare necessary documents for filing as soon as possible a lawsuit against the United States. Mesa and McCulloch advised they would join in the suit. The other companies were requested to advise early in the week of March 17, 1969,

whether they would join. The minutes further provide:

> Most of the members present advised that they would not participate in the drilling of another well in the Santa Barbara Channel as long as the absolute liability rule was in effect as promulgated by Secretary of Interior when he amended Section 250.42 of Title 30 CFR.
>
> It was decided that the decision as to whether or not we furnish the geological, geophysical and structural information demanded by the Secretary of Interior would be held in abeyance until final decision has been made regarding the filing of the proposed lawsuit.

(b) Pauley promptly learned directly or indirectly of the various actions of the Interior officials following the oil spill with respect to the OCS channel lands, and kept its fellow lessees advised as to such events as the Secretary's shutdown telegrams of February 7, 1969, the issuance of OCS order No. 10, the revisions of the liability regulation, and the lease clearance requirements and procedures.

(c) Prior to the special meeting of the Operating Committee on March 12, 1969, Pauley and its co-lessees had received on March 1, 1969, the Secretary's above-quoted telegram requesting submission of all available geologic, geophysical and structural information for review of safety factors in drilling operations. By letter dated March 4, 1969, Pauley supplied copies of such telegram to its co-lessees, suggested that the furnishing of any information be taken under advisement until advice could be obtained from Pauley's attorneys, and that if any information was supplied, such should be done by Pauley as operator. After the special meeting, Pauley by letter dated March 17, 1969, advised Regional Supervisor Solanas of the receipt by Pauley and its colessees of the Secretary's telegram of March 1, 1969, and requested advice as to the exact information needed and the form in which it should be submitted. Pauley asked Solanas if its understanding was correct that the information should be furnished if and when Pauley requested another drilling permit on one of the subject leases. Pauley asked for a prompt reply because it had to secure concurrence of its co-lessees on any decision for the release of the highly confidential information and

trade secrets. By letter dated March 17, 1969, from Pauley to Kewanee, with copies to all other co-lessees, Pauley furnished copies of its letter of the same date to Solanas, stated that conversations with personnel of the Geological Survey indicated that the requested information need not be furnished unless Pauley filed another application for a drilling permit, and that if this was true, the problem was simplified. Pauley further advised that the colessees would be polled for a vote concerning releasing of the information within the near future, reminding the co-lessees that at the recent meeting, it was unanimously agreed that compliance with the Secretary's request for the information would be held in abeyance pending final determination as to whether or not the colessees decided to file a lawsuit against the United States.

(d) In the absence of Regional Supervisor Solanas, Acting Regional Supervisor Schambeck, on March 20, 1969, replied to Pauley's letter to Solanas of March 17, 1969. This reply was prepared for Schambeck's signature by Mr. Fackler and Mr. Yenne, the members of task force II, and it states as follows:

In answer to your inquiry of March 17, 1969, the geologic information needed by this office on leases P-0226 and P-0218 are a structural contour map on a Pleistocene horizon and, if possible, one on a Miocene horizon; a geologic cross section on each lease; a type log showing formation tops and paleontological tops; any information you may have on formations from the ocean bottom to a depth of 500 feet; and finally we would like to see your geophysical information. None of the aforementioned data will be allowed out of controlled areas in our office and will be available only to specific responsible geologists and engineers of the U.S. Geological Survey. If your geophysical data generally agrees with the submitted structural contour map, we will not require geophysical data to be filed with the other information at this time.

Engineering data required is mainly safety measures which will be taken while drilling additional wells. Casing programs on a lease basis should be tied to geological markers and to high pressure zones when expected. The mud program specifications

and controls - such as mud level indicator, etc. - and the necessary blowout prevention equipment program must be submitted.

The above information is required before applications to drill additional wells may be approved.

Should you have any further questions, do not heistate to contact this office.

(e) On March 21, 1969, Pauley responded to Schambeck's letter, stating as follows:

Thank you for your letter of March 20, 1969 regarding geologic information needed by your offices on leases P-0226 and P-0218. We have previously furnished you with e-logs and well histories with paleo formation tops of prominent markers on all wells drilled by our Group on the aforementioned leases.

I interpret your letter to mean that we need not furnish you any additional geologic information on these leases until such time as we apply for another well

permit on one of the leases. Is this interpretation correct?

If at any time you need any information on or would like to discuss the geology of our leases, we would be glad to discuss it in our offices here in Los Angeles. Please feel free to call upon us at any time.

We are in communication with our partners regarding your letter of March 20th. We would appreciate an immediate reply to this letter regarding our interpretation that the information does not have to be furnished until another well permit is requested, since we must communicate your comments to our partners immediately upon receipt.

(f) By letter dated March 21, 1969, Pauley wrote to all of its co-lessees, furnishing copies of Schambeck's letter to Pauley, dated March 20, 1969, and copies of Pauley's letter to Schambeck, dated March 21, 1969. Pauley commented that it interpreted Schambeck's letter to mean that "we do not have to furnish any more information until we apply for a well

permit." Pauley advised that it had furnished electric logs and well histories with paleo formation tops to the Geological Survey, and stated its belief that the main information the Survey wanted was for the Pleistocene horizon and the first 500 feet of depth, commenting that a structure map on such horizon with a seismic line could be furnished without much difficulty. Pauley stated that it felt that such information should probably be furnished, and requested each co-lessee to advise in writing as to whether or not it agreed. The only response of record in this case was that of Kewanee, which by letter dated March 25, 1969, advised Pauley that it approved furnishing the Survey with the structure map on the Pleistocene horizon along with the seismic line, and urged Pauley to furnish the survey with the seismic and other data listed in Schambeck's letter to Pauley, dated March 20, 1969.

(g) By letter dated March 27, 1969, Acting Regional Advisor Schambeck responded to Pauley's inquiry in its letter of March 21, 1969: "Is this interpretation correct"? Such letter states as follows:

Your interpretation that you need not furnish this office additional geologic and engineering information on leases OCS-P-0226 and OCS-P-0218 until such time as you make application to drill a well is correct.

This does take some time to process and check, however. So if you do have plans to drill, I advise you to comply well in advance of your application to drill.

(h) On April 4, 1969, Pauley furnished Acting Regional Supervisor Schambeck with a structure map, described as uppermost Pliocene or lower Pleistocene, together with four seis line record sections, and concluded its letter of transmittal with the following comment.

> If at any time you need any other information or would like to discuss the Geology of our leases, please give us a call and we will arrange a mutually satisfactory meeting.

This action by Pauley occurred only 5 days before the filing of plaintiffs' petition in this case, which states the basic complaint

that on February 17, 1969, the Secretary of the Interior had promulgated new regulation 30 C.F.R. 250.42(b), which imposed upon lessees of subject tracts "absolute liability, regardless of fault, not only for damage caused by any oil escaping, for whatever reason, from any drilling or production operation, but for the expense of cleaning up regardless of damage any such oil," -- and that by such action, "the Secretary has rendered it economically and practically impossible for plaintiffs to continue further drilling or production operations under lease No. OCS-P-0218 for Tract 375 and lease No. OCS-P-0226 for Tract 384." The petition further states that because of the imposition of absolute liability "plaintiffs have been prevented from engaging in such operations on the leased parcels since the promulgation of the aforesaid regulation by the Secretary on February 17, 1969."

(i) With respect to the clearance procedure, plaintiffs did not provide the Geological Survey with the geologic cross section of each of its lease tracts, a type log showing formation tops and paleontologic tops, information concerning the formations from the ocean floor to a depth of 500 feet, and the

engineering data, all as required by Acting Regional Supervisor Schambeck in his letter to Pauley, dated March 20, 1969. Plaintiffs never undertook to amend their application for a permit to drill Well No. 2 on tract 384 to include the requirements of OCS order No. 10, issued by Secretary Hickel on March 28, 1969.

(j) The uncertainty about the intention of the colessees of subject tracts to conduct further drilling operations was indicated by actions relating to the approval of proposed Well No. 2 on tract 384. At the Operating Committee meeting on January 23, 1969, Ashland offered to dispose of its interests in both tracts, and while negotiations were conducted with Forest and McCulloch, no co-lessee acquired Ashland's interests in either tract. Ashland never voted for the drilling of Well No. 2 on tract 384, although all of the other co-lessees did, but there is no showing that any one or more of the other co-lessees agreed to assume Ashland's share of the costs. On January 27, 1969, Pauley issued its cash call on the co-lessees to contribute their cost shares, but there is no evidence that such action had been approved as required by the operating agreement. On February 4,

1969, Kewanee advised Pauley that it would not honor the call, and on February 7, that it was opposed to further drilling until the Union well blowout problem and Geological Survey attitude were clarified. In the meantime, Pauley prepared a revision of its proposed drilling program, and recomputed the costs, but these actions were not submitted to the Operating Committee for approval. On February 10, 1969, Pauley mailed its application for a permit to drill to the Geological Survey. On February 12, 1969, Pauley issued its revised cash call on the co-lessees, not approved by the Operating Committee. On February 19, 1969, Pauley canceled the cash call, stating that it did so in view of Secretary Hickel's suspension of all drilling operations in the Santa Barbara Channel, and this letter indicated that some colessees had contributed, but others had not. Pauley did advise the co-lessees that a new cash call would be issued when Pauley was in a position to proceed with further drilling operations.

(k) From the foregoing, it is concluded that plaintiffs have not intended since mid-March 1969, after considering the new liability regulation issued by Secretary

Hickel, to conduct further drilling operations on subject tracts, and that this is the reason why they failed to pursue the Department of the Interior's clearance procedures to permit future drilling operations, and why they failed to file an application for a permit to do further drilling in compliance with the requirements of OCS order No. 10.

79. (a) Because of the adverse and disappointing reports concerning the potential of subject tracts due to the drilling of dry holes, various of the plaintiffs wrote off their investment costs in such tracts, or otherwise adjusted their financial statements.

(b) In its annual report to stockholders, issued December 12, 1968, Ashland stated that it had written off against income its investment in subject tracts, thereby reducing overall earnings in 1968 by $4,019,782.

(c) Colorado is a subsidiary of Colorado Interstate Corporation, and the parent corporation in its consolidated annual report to stockholders for 1968, covering Colorado and other subsidiaries, stated that in 1968 it had

written off $5.3 million covering the company's total leasehold and drilling costs, net of Federal income taxes, on subject tracts. It was explained that after drilling eight exploratory wells, it was determined that subject leases do not have reserves capable of commercial production, and that while further drilling was planned, the company's share of such costs would be minor and no additional write-off would be required.

(d) Husky is a subsidiary of Husky Oil Ltd., and in the parent corporation's annual report to shareholders for 1968, it was stated that eight wells had been drilled on subject tracts, in which the company holds interests, and that the economics of such development was marginal, and that its investment of $8,518,000, plus $491,000 in interest on borrowed capital, would be added to depletable costs in five annual installments commencing in 1968, subject to change in the event commercial production is established or the leases abandoned during the 5-year period. It was explained that the results of the drilling prompted the transferring of the lease costs into depletable costs, and that had the total costs been included in 1968 depletable costs,

earnings for that year would have been reduced by $716,000. On proven oil and gas reserves, Husky capitalizes exploration and production costs for depletion on composite unit of production methods.

(e) In its annual report to stockholders for 1968, Midwest advised that it had acquired interests in subject tracts at a cost of $8.4 million, that six wells had been drilled on tract 375 in 1968, and one on tract 384, and that all of such wells were unproductive, although shows of oil and gas were encountered in several of them. With respect to its investment in subject tracts, Midwest stated that in 1968 it had adopted a change in accounting policy, amortizing the cost of nonproducing oil and gas properties over their estimated holding periods, which resulted in reduction of 1968 earnings by $800,000, representing a 20 percent amortization of the cost of subject tracts. It was stated that the balance of such cost might have to be written off in 1969 or in future years.

(f) In its annual report to shareholders for fiscal year ended August 31, 1968, Pauley's president, William R. Pagen, and its

chairman of the board, Edwin W. Pauley, advised in their message to shareholders, dated November 14, 1968, that the company's share of the total bonus payments was $5,667,200 of the $73,853,574 paid by the Pauley group for the right to drill on subject tracts, that six wells had been drilled, of which two had encountered oil, but it was not possible to make a sound judgment on the commercial value, if any, of the reservoir without additional drilling. They further advised that it was planned that several additional wells would be drilled on the leases during the fiscal year ending August 31, 1969. It was explained that during that period of time, the company might or might not be able to establish evidence of commercial production on one or both of the leases, and in the absence of such evidence, the company might then write off part or all of the unamortized portion of each lease. Pauley's annual report stated that the company's investment in subject leases was $4,659,285 after writing off costs of approximately $1 million on the portion determined to be unproductive.

80. (a) Following the Union well blowout and oil spill, the liability insurance market for oil companies collapsed as to cover-

age for damages caused by oil spillage in offshore operations. In the huge London market, known as Lloyd's, every major oil company had had this type of coverage, but thereafter Lloyd's adopted a standard clause excluding such coverage. When Husky's liability insurance policies were renewed at the end of 1969, they were expressly made subject to exclusion of liability for offshore oil spillage, although the largest insurance broker in Canada unsuccessfully surveyed the market to find that type of coverage for Husky. A large Los Angeles insurance brokerage firm, specializing in insurance for oil companies, found it increasingly difficult to find coverage for offshore oil pollution, and by January 1, 1970, concluded that such coverage was no longer obtainable in any significant amount. Pauley's insurance broker also surveyed the market to obtain the offshore oil spillage coverage, and concluded that such coverage was unobtainable.

(b) Prior to the Union well blowout and oil spill, Pauley had liability insurance in the sum of $25 million, including coverage for oil pollution damage resulting from offshore drilling, but thereafter, in order to avoid cancellation of its policies, Pauley had to accept endorsements excluding such coverage.

* * *

ITEM E

Order of Court of Claims dated November 10, 1975

(Curtailing Trial Judge's Reference)

IN THE UNITED STATES COURT OF CLAIMS

No. 197-69

PAULEY PETROLEUM INC., COLORADO OIL AND GAS CORPORATION, MESA PETROLEUM CO., McCULLOCH OIL CORPORATION OF CALIFORNIA, J. M. HUBER CORPORATION, and HUSKY OIL COMPANY OF DELAWARE

v.

THE UNITED STATES

O R D E R

Pursuant to the provisions of Rule 134(h),

IT IS HEREBY ORDERED that the report of the trial judge in this case shall include only his findings of fact and that proceedings in the case after the filing of his report shall be in accordance with Rules 141-144 inclusive, provided that any party may repeat in his brief to the court any material which was contained in the party's brief to the trial judge.

BY THE COURT

Wilson Cowen
Chief Judge

Nov. 10, 1975